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# Annual Review of Telecommunications in the Government of Canada 1979/1980

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Government of Canada  
Department of Communications

Gouvernement du Canada  
Ministère des Communications







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✓✓ ANNUAL REVIEW OF TELECOMMUNICATIONS  
IN THE GOVERNMENT OF CANADA  
1979/1980 ✓

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DEPARTMENT OF COMMUNICATIONS

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## Preface

The third Annual Review, published in January 1980, contained for the first time a long range planning framework for the development of the federal government telecommunications system. Source materials included information on plans submitted voluntarily by certain departments. The intention was to increase management awareness of telecommunications in the federal government, to persuade management of the need to plan and to provide a general direction for planning. This direction was towards office automation, because the majority of expenditures are for administrative communications and because this is where the greatest potential for improved economy and efficiency lies. Moreover, administrative communications are a common requirement of all departments, thus providing an appropriate focus for the Department of Communications' mandate to plan and coordinate on behalf of the government as a whole. There are indications that the third Review has been received positively by senior departmental management throughout the government.

This Review is intended to provide management with the tools to take action. It incorporates an analysis of departmental systems plans, the submission of which was required by Treasury Board Canada. It assumes familiarity with the previous edition and builds on information contained therein. Analyses are therefore concise. Elaborations and supporting material are contained in appendices and are available from the Director General, Government Telecommunications, in the Department of Communications.

Subsequent editions of the Annual Review will provide progressively more concrete guidance to management and planners. The approach throughout will be evolutionary, proceeding from simple to complex to refined planning increments. In the words of a speaker at the First Global Conference on the Future commenting on the transformation of communications,

"This is an uncharted territory. Communications are not a substitute for substance. Small issues can grow to gigantic proportions if left unattended. Therefore we must plan, test, build, improve and proceed with caution and courage."

ANNUAL REVIEW OF TELECOMMUNICATIONS  
IN THE GOVERNMENT OF CANADA  
1979/1980

TABLE OF CONTENTS

	<u>Page</u>
<u>Executive Summary</u>	
1. Current Status of Expenditures, Systems and Planning	i
2. Target Status in Five Years	iii
3. Changes Required to Achieve Target	iii
4. Strategy for Achieving Target and Remaining Current	iv
5. Key Recommendations	v
 <u>Long Range Planning Framework</u>	
1. Purpose	1
2. Government Objectives and Priorities	1
3. Strategic Objectives	3
4. Environmental Analysis	4
4.1 Federal/Provincial Relations	4
4.2 Legislative Influences	4
4.3 Regulatory Influences	5
4.4 Policy Influences	7
4.5 Available and Emerging Technologies	9
4.6 Economic Influences	10
4.7 Social Influences	11
4.8 Government Research and Development	13
4.9 Standards	16
4.10 Summary	17
5. Survey of Carriers	18
6. Survey of Equipment Suppliers	19
7. Survey of Information Providers	21
8. Analysis of Departmental Plans	23
9. Major Departmental Undertakings	43
10. Forecast of Expenditures and Personnel	46



TABLE OF CONTENTS (cont'd)

	<u>Page</u>
11. Conclusion	52
12. Cost/Benefit Considerations	53
13. Implementation Considerations	54
<u>Recommendations</u>	55

Appendices

A	Telecommunications Expenditures and Personnel
B	Inventory of Operating Telecommunications Systems
C	Directives & Guidelines
D	Status of Standards
E	Conceptual Definition of an Automated Office Network for the Federal Government - Preface
F	Reading Guide





## EXECUTIVE SUMMARY

### 1. Current Status

#### Expenditures and Personnel

Returns from the 52 departments and agencies required to submit annual telecommunications reports to Treasury Board Canada covered over 98.5% of total telecommunications expenditures (operating and capital) plus salaries reported in the Public Accounts, up 1% from the previous year. The \$350 million total represents a real decline in expenditures for the first time since procedures were instituted in 1976/77 to collect this information. At 2%, the overall growth rate was well below that of inflation, compared to a traditional growth rate of 15%-20%. This is the more significant because common carrier industry revenues rose by an estimated 15% in 1979. Operating expenditures increased by less than 1%, and a 15% rise in personnel costs was offset by a comparable decline in capital expenditures. The decline is attributed to major cost decreases in two departments and the following factors:

- absence of significant rate increases in 1979/80
- reduction in the size of the public service
- government restraint programs
- improved management of telecommunications resources
- introduction of a new authorization call code system.

Identification of telecommunications expenditures is still impeded by the inadequacies of the financial coding system and the definition of telecommunications, but progress is reported in both these areas.

Reported person-years grew 6% to 6,106 and salary increases averaged 8% rather than the forecast 7%. Contract and consultant personnel were reported for the first time in significant numbers, but no major new categories of personnel were added. Thus reported figures are now considered reliable. Further information on expenditures and personnel is found in Appendix A.

#### Systems Inventory

Information on the technical and operating characteristics of an estimated 73% of all departmental telecommunications systems by dollar value is now contained in the systems inventory, but the inventory is up to date for only 47% of total government systems by dollar value. Coverage of installations outside the National Capital Region is deficient, and complete information is not yet available on equipment such as communicating word processors now being installed at an explosive rate in the office. These limitations result from the lack of basic information in departments to which the Auditor General's Report for 1979 alluded. Update reports were received from only 30 departments, or 58% of the total, in this fourth year of reporting.

Aside from the deficiency of its contents, the inventory is not easily accessible for enquiry. It is planned to develop a data base capability over the next year to facilitate enquiry and update. Specifications for this new inventory system will be made available so departmental inventories can be developed along compatible lines and eventually link up to the main inventory. Further information on the inventory is found in Appendix B.

## Planning

The long range planning framework contained in the Annual Review is the focal point of the Department of Communications' efforts to carry out its mandate to "plan and coordinate government telecommunications". The planning framework published in the previous edition identified office automation as the principal strategic area for overall government planning. This edition is supported by the Conceptual Definition of an integrated office network, intended to serve as a common frame of reference for the planning of office communications systems throughout the government (see Appendix E). The definition should provide management with a uniform foundation on which to build practical tests and do development work and an incentive to allocate resources to this work.

The framework is designed to support the overall strategic objectives and approach for long range planning and development of government telecommunications. These objectives may be summarized as follows:

- to provide effective and efficient use of telecommunications resources in support of departmental operations and program delivery.
- to provide capability for information access and sharing within the government and with the public at large.
- to permit orderly introduction and use of information technology.

Departments were required to submit five-year telecommunications plans to Treasury Board Canada for the first time in 1980. These are analyzed in Section 8. There is evidence of some improvement in plans, but reporting is still inadequate. Many departments submitted nominal or no planning information. The Annual Review should assist departments in developing long range plans.

## 2. Target Status in Five Years

The 1980's are expected to be a decade of accelerated change in which the transition is made to an "information society" via the automation of the office and the development of integrated networks. To keep pace with, let alone foster these developments, the federal government should have automated key business functions in at least five major departments and linked these departments in a network within five years. By the end of the decade major business functions should be automated throughout the government and all departments should be linked in a network with each other, provincial government departments and some private businesses. Achievement of these targets should be considered as a major strategic objective for the development of the government telecommunications system.

This document focuses on the five-year period 1981-1986. Two technological milestones expected in this period serve as reference points for the discussion because of the expansion of computer communications capability they will permit. These are the availability of the 32- and the 64-bit micro-processor at extremely low cost in 1983 and 1985 respectively. The Conceptual Definition supporting this document describes how information is processed and managed now, and how it is expected to be in 1983 and 1986.

## 3. Changes Required to Achieve Target

First, a better appreciation of the human dimension of office work is required.

Second, the awareness and support of senior management is essential to mobilize resources and apply them to appropriate projects. By far the most important of these is human resources. In general, management does not appreciate the implications of the technology for the way government conducts its business. Nor does it appreciate the speed with which it is developing. Thus it has paid insufficient attention to the need for professional telecommunications expertise to be developed and consulted.

Third, fiscal feasibility is required. Without an assurance of adequate cash flow to support appropriate innovations over the five-year period, the best efforts of individual planners will be frustrated. This assurance is not possible now because there is no fiscal control mechanism in place to quantify and synchronize departmental funding requirements against projected available cash. Departments are not obliged to submit telecommunications plans to Treasury Board Canada for funding authorization, although this is required for EDP programs. The implementation of an effective mechanism for reporting telecommunications plans is urgently required.

The need for fiscal control must not be allowed to stifle departmental initiatives aimed at exploiting the potential of information technology. A fourth requirement is that a policy framework be established without delay to permit departments to experiment. To prevent duplication of effort and ensure that benefits are shared, the policy should provide for the cooperative development of the network using departmental expertise in specific areas to advantage.



#### 4. Strategy for Achieving the Target and Remaining Current

Given the scope of the undertaking, a prerequisite for success will be a unified approach in which representative departments test well-defined components of a total system in logical order and share the results of their work with other departments. The need for such an approach is supported by the Treasury Board Task Force on Information Technology. The Department of Communications proposes to provide the umbrella under which this cooperative development strategy could be implemented.

As a first step in this direction, this edition of the Annual Review is supported by the Conceptual Definition of an Office Communications Network for the Federal Government. It is expected that subsequent editions of the Annual Review will expand on the definition by providing functional specifications for the network based on the results of practical tests conducted by departments, and by providing implementation guidelines to ensure that all departments can be included in the network. Detailed cost/benefit information gathered via tests would be included.

Pilot tests are essential and should be launched immediately, starting with manageable applications offering substantial early returns. Selection should be on the basis of low front-end cost and potential for improved efficiency, effectiveness and economy. The approach should be to learn as you go, build on what you know, and pay for what you use. Basic problems should be resolved before more complex testing is undertaken, so that the development program is characterized by an orderly evolution from simple to complex to refined stages.

To ensure that the system specified will remain current over time, the point of departure for the design must be user needs, not the capabilities of technology. Involving the user in the definition of the system will also reduce resistance to change. The most important user is the manager, without whose acceptance no real progress can be made. The role of the manager in the system must therefore be defined. More must be learned about the behaviour of the office worker.

These five criteria summarize the characteristics of a successful strategy: orderly development, low cost start-up, efficiency potential, effectiveness potential and economy potential.

5.        Key Recommendations

1. The Department of Communications should take the lead in fostering cooperation among departments in the planning, development and implementation of innovative government telecommunications applications and systems, with priority on office communications systems and the use of satellites.
2. In conjunction with the initiatives of Treasury Board Canada to establish a comprehensive policy and development strategy for the use of information technology, departments should evaluate their internal policies, procedures and organizational structures to facilitate the integration of telecommunications, data processing and office administrative functions permitting the efficient and effective management of information. The Department of Communications should proceed to establish recommendations for a policy framework aimed at the efficient and effective use of telecommunications as the binding agent in the management of information.
3. Departments should establish the position of Telecommunications Coordinator in accordance with the Occupational Profile for Telecommunications Coordinators.
4. The Department of Communications should extend its seminars for departmental telecommunications staffs to include those responsible for departmental planning.
5. Departments should take steps to evaluate the effectiveness and economy of media switch in their particular applications. For example, the use of innovative office communications systems such as communicating word processors, multifunctional terminals and electronic messaging systems to replace paper, voice and face-to-face meetings should be examined.
6. At the same time, departments with representative requirements and/or special expertise should join with the Department of Communications in the cooperative testing and development of innovative office communications systems. The results of this collaboration should be made available to other departments.





## LONG RANGE PLANNING FRAMEWORK

### 1. Purpose

The purpose of the long range planning framework is to implement the Department of Communications' mandate to "plan and coordinate telecommunication services for departments, branches and agencies of The Government of Canada". Though set forth in the DOC Act, the long term planning dimension of this mandate was addressed for the first time in the last Annual Review for a number of reasons, namely:

- Departments were not obliged to provide DOC with information on their systems plans until 1980.
- The cost of government telecommunications was not sufficiently visible, and the potential of information technology not sufficiently developed, to attract the interest of departmental managements to telecommunications planning.
- There was no clear process allowing DOC to plan and coordinate on behalf of the government as a whole and departments to plan their own systems. The planning process endorsed by the Telecommunications Advisory Committee in January 1980 provided this.

Seminars held for departmental Telecommunications Coordinators early in 1980 demonstrated a critical need for the Department of Communications to provide managers with an inspiring common goal for telecommunications planning and concrete guidelines on how to proceed. This is what the long range planning framework is intended to do.

### 2. Government Objectives and Priorities

The overall tone and priorities of the current government, expressed in the Speech from the Throne on April 14, 1980, have implications for the government telecommunications system. These statements by the Governor General indicate a commitment to streamlining government operations and improving relations with the public:

"My Ministers believe that Canadians want more effective government, not less government"; and "Improving the efficiency of the federal government is as important an objective...as reducing the deficit."

Within this context legislative priorities were announced which should be accounted for by telecommunications planners. These are Freedom of Information and the conversion of the Post Office to a crown corporation. Bills covering both were tabled in the House in July and are expected to receive quick passage into law. The implications of these legislative priorities were examined in some detail in the previous edition of the Annual Review and are summarized and updated in section 4.2 of this document.

Highest priority is being given by the federal government at the political level to resolution of constitutional issues with the provincial governments. This is discussed in section 4.1.

At the bureaucratic level the government's commitment to streamlined operations and better relations with the public has been translated into the establishment of a number of task forces. A Treasury Board Task Force on Freedom of Information has been working to identify the type and location of information to which the government must be prepared to provide public access, and has stimulated the publication of an index of government data bases. A DSS Task Force on Service to the Public is working to provide easier access to government information in the immediate term, mainly via conventional telecommunications systems. Developments in this area will have a significant effect on the design of the government telecommunications system, since the current infrastructure is inadequate to support the future flow of information between the public and private sectors.

A Task Force on Information Technology was established by Treasury Board Canada in February 1980 to examine the implications of the convergence of computing, telecommunications and office equipment and to propose broad principles for a policy which would enable both government operations and program delivery to benefit. Three issues are considered to be of major importance in the government's use of information technology, namely: the need for orderly development, the need to maximize benefits and the need to support Canadian industry.

Despite the government's stated commitment to efficiency and effectiveness, the 1979 Report of the Auditor General made it clear that the management of telecommunications in the federal government is inadequate. The seven departments audited were not in general complying with the Guide on Telecommunications Administration. Specifically, they had not: established action plans and control systems; developed short or long term plans in terms of resources and costs; developed cost accounting systems; coordinated the planning, use and evaluation of telecommunications services; or gathered information needed to monitor telecommunications services.

In its review of the Auditor General's report in June, the Public Accounts Committee of the House of Commons emphasized its concern about the lack of control over expenditures and announced its intention to monitor progress in planning and control via the Annual Review. At the same time the Committee looked for evidence that the Department of Communications is acting on its mandate to plan and coordinate. This document reports on the Department's initiatives in this direction.

3. Strategic Objectives and Approach for Long Range Planning & Development of Government Telecommunications

The strategic objectives for long range planning and development of government telecommunications can be stated as:

- use of government telecommunications resources should efficiently and effectively meet the operational and program delivery requirements of government departments and agencies;
- government telecommunications should provide capability for information access and sharing within the government and between the government and the public at large, and capability to ensure connectability of information sources;
- planning and development of government telecommunications should permit orderly introduction and use of information technology in government operations, ensure that the government realizes fullest possible benefits, and that it supports Canadian industry.

Achievement of these objectives requires the establishment of long range plans for the introduction and the use of the technology as well as a framework of policies and guidelines in support of planning, monitoring and coordination functions. A prerequisite for planning and development of government telecommunications is the definition of strategic areas and objectives for the development of telecommunications applications in the government. A second essential task is the planning and development of the infrastructure (i.e. systems, networks, methodology and policies) required to support these applications. With these objectives, and to exercise its mandate, the Department of Communications has established a program to carry out these tasks as reported under section 9 - "Major Undertakings - Department of Communications".



#### 4. Environmental Analysis

##### 4.1 Federal/Provincial Relations

Constitutional change, specifically the division of powers between federal and provincial governments, has acquired a high profile in 1980. Among the issues discussed by officials in multilateral talks preceding First Ministers' meetings in September was control over intra- and interprovincial communications.

Aside from talks aimed at preparing for constitutional change, there is a separate channel for discussion of communications issues of mutual concern to federal and provincial governments which can be dealt with within the current constitutional framework. Working groups were established by the October 1979 meeting of ministers of Communications on the subjects of Pay TV (the work of this group is now complete and a report was presented in July), Industrial Strategy, Industry Structure and Competition, and Cable Delegation.

It is worth noting that intergovernmental business itself is not supported by an adequate communications structure. Effective dialogue requires the sharing of enormous amounts of information and the constant exchange of documentation, often under severe time constraints. In the present circumstances most of this exchange is carried out by mail and at meetings to which officials must travel from all over the country. New forms of network technology and services could cut the cost and effort involved in preparing for these meetings dramatically while speeding up the rate at which business can be conducted. Intersectoral communications systems of the type alluded to here are now being established in the United States.

##### 4.2 Legislative Influences

Two bills before the House at the time of writing are of interest to telecommunications planners. The government intends to convert the Post Office to a crown corporation. The implications of Freedom of Information legislation (Bill C-43) were examined in the previous Annual Review. They can be summarized as requiring the design and development of a new, interactive, publicly accessible communications network linking organizations and individuals in the private sector to federal government data bases in such a way that the nature of traffic can be monitored. Some of the data bases already exist in automated form, but even these are not now accessible via a uniform procedure and affordable equipment. An attempt to move in this direction is being made by launching a pilot test of Telidon as a delivery system for federal government information.

A new Telecommunications bill is expected to be introduced in the House some time after the fall of 1980. Previous bills did not pass into legislation.

### 4.3 Regulatory Influences

Complex issues face the regulators. A number of major decisions were made in 1979/80 which will have fundamental impact on the telecommunications and information industries and on the users of their services.

CNCP was granted the right to connect to the Bell system in March 1979, thereby making its services more attractive to potential users, and is now working to establish the same type of arrangement with B.C. Telephone. In November 1979 Bell Canada applied for permission to allow telecommunications equipment from other suppliers to be attached to its system on condition that it be allowed to approve the equipment and charge a fee. In general the federal government has declared itself in favour of liberalized terminal attachment where it is feasible and deemed by the appropriate regulatory body (the CRTC in the case of Bell) to be in the public interest. Hearings on this application, which were scheduled for the fall of 1980, have been postponed to the spring of 1981, but an interim decision announced in August approved interconnection of equipment other than main local telephones without Bell's permission as long as it meets U.S. Federal Communications Commission (FCC) or Bell standards or is similar to Bell equipment.

This puts a wider choice of telecommunications equipment at the disposal of the user. Departments contemplating installation of such equipment should however bear in mind that this decision is not final and is the subject of petitions to the Governor-in-Council. Petitions have been presented by the Ontario Government and the Telecommunications Workers' Union. These parties are concerned that the decision was reached without public hearings, did not take account of the impact on Canadian industry and employment and did not specify the use of Canadian standards (none has yet been formalized). Given the interim nature of the decision, it is essential that departments consider the implications of possible changes before proceeding with costly installations.

The World Administrative Radio Conference (WARC), convened once every twenty years to revise international radio regulations, was held in November 1979. Revision of the regulations opens up opportunities to install new systems and to replace obsolete equipment. At the 1979 session there were demands for provision of fixed communications in frequency bands other than HF, and for new frequency bands for maritime mobile and aeronautical mobile services.

On the subject of rates, Bell was granted significant increases by the CRTC in August. A hearing on CNCP's application to the CRTC for increases on its telegram, Telepost, Telex, Broadband Exchange and private wire services will be held in November. The earliest these increases could come into effect is December 20, 1980. Since Bell prices normally set the pace for the rest of the industry, it can be assumed that increases which would bring CNCP rates into line with those of Bell for similar services will be approved.

A rate hearing is under way for B.C. Tel at the time of writing, and decisions on Bell and B.C. Tel TCTS (interprovincial) rates and on Telesat's rates are pending. A decision on the rate increase application by Terra Nova Tel, a CNCP subsidiary, is expected in late October to come into effect in early November. An application by another CNCP subsidiary, Northwest Tel, will be heard in December and would become effective in February 1981 at the earliest.



#### 4.4 Policy Influences

The previous Annual Review referred to the federal computer communications policy proposed in a 1973 Green Paper. During the past year awareness of the technology and its implications has grown in the federal government, and the concept of "information technology" has supplanted "computer communications" as the expression for the convergence of telecommunications, computing and electronics (particularly microelectronics).

The need for a federal posture on automated information has been recognized. Issues as diverse as regulation, decentralization of government operations, research and development, procurement policy, relations with provincial governments, privacy and security, employment and education must now all be looked at afresh within the context of the economic and social transformation being brought about by the application of information technology.

The governments of most other industrialized countries acknowledged and followed the Canadian lead into this uncharted territory in the early to mid 1970's and have now put such policies in place. Public participation has been sought in the development of the policies and mass public education and awareness campaigns launched to explain the necessity for aggressive action. These initiatives are supported at the highest levels of government.

In 1972 the Computerization Committee of the Japan Computer Usage Development Institute proposed that Japan transform itself from an industrial to an information society by 1985 and defined how and at what cost (\$65 billion) this could be done. The goal and the strategic plan were accepted and action taken to put the plan into effect. Money is being diverted from the industrial sector and spent as proposed. Some \$3 billion a year are allocated to education and training to smooth the transition. A major project is the automation of central and local government data banks and the development of an Administrative Information Centre on this foundation by 1985.

The European Community resolved in 1971 to formulate the information policy which has now led to the establishment of a European information network (Euronet).

The President of France commissioned the Minc-Nora Report of 1978 on the Informatisation de la société, a best seller in France now published in English, and used it as the basis for accelerating the transition to an information society despite a forecast negative effect on employment. Measures taken include outfitting each household with a low cost two-way video terminal to access telephone listings and suspending the more expensive publication of printed directories. (See Reading Guide for documents relating to these plans.)

The need for similar initiatives in Canada has been recognized. The independent Communications Research Advisory Board (CRAB) in its 1979 Annual Report to the Department of Communications states that "it is imperative that there be a focal point in government for the policy decisions and research support so urgently required" to sidestep the dangers and capitalize on the opportunities of the information revolution.

A vital component of any comprehensive policy is the role of government. Given the government's position as the country's largest employer and consumer of goods and services, the way in which it uses information technology to conduct its own business will have a profound effect on how Canada copes with the challenges of an information society. Yet there is no comprehensive policy on information management within the government to guide departments. There is a well defined EDP policy, an evolving telecommunications policy and separate policies on matters such as office equipment, records management and library services. The shortcomings were also identified by the Auditor General in 1979. A comparison with the approach of the U.S. federal government is striking. Washington has established an Office Automation Council with Director level membership from 27 federal departments and agencies. The Council works in conjunction with an Industry Committee and has collaborated in the development of an Office Automation Conference exclusively for federal administrators to be held in Washington in November 1980.

A Task Force on Information Technology was established by Treasury Board Canada in February 1980 to tackle these issues, and a proposal made in April to develop policy in these areas: administration, personnel, economy and efficiency of program delivery, and support for Canadian industry. Deputy Ministers of 15 major departments were asked to comment. The importance of developments in information technology to the federal government was recognized by all respondents. There was agreement that the most economic approach to implementing information technology was top-down (i.e., considering government offices as a total system) rather than piecemeal. At the same time all respondents stressed that any approach to government-wide policy development would have to allow for individual departmental initiatives to be supported rather than stifled. The net result appears to be in favour of guided laissez-faire. A policy framework would be established within which departments could proceed to develop their own internal policies and procedures. Commonalities and differences would then be compared and a consolidated policy prepared on the basis of experience. A number of departments have established or are now establishing policies and procedures for integrated management of information.

Policy can be regarded as a view of a path to a goal. A prerequisite for policy development is therefore a well defined goal. This document proposes such a goal and examines how it might be achieved through the cooperative, experimental efforts of government departments. The approach to policy development discussed above parallels the proposed system development strategy and could therefore ensure that policy is rooted in practical requirements. The kind of policy development process needed to benefit from interaction with system development projects is outlined in section 13 (Implementation Considerations).

#### 4.5 Available and Emerging Technologies

It has recently been said that if air transportation technology had developed since 1959 at the rate of the silicon chip, one could now cross the Atlantic in two seconds for two cents in a plane the size of a shoebox. In 1980 two further quantum leaps in the evolution of the chip are on the horizon: low-cost 32- and 64-bit microprocessors are expected to become available in mass quantity in 1983 and 1986 respectively. These will expand the power of the microprocessor exponentially, making the automation of functions which are now too complex to be viable quite straightforward.

All the technology required to automate and interconnect offices is now available at low cost. However, relatively little of this technology is generally available in the form of office products and services. There are a number of reasons for this, among them lack of experience by systems designers in understanding and interpreting user needs, lack of commercial viability, and regulatory obstacles. The challenge is to synthesize components and produce "convivial" systems to satisfy real needs.

The following technologies promise to play a key role in future developments:

Satellites will handle an increasing proportion of communications traffic because they provide the high speed, high volume transmission needed to eliminate queuing and storage at the sender location, and because the transmission medium - space - does not have to be protected or maintained. Furthermore, they render much of the complexity of communications systems transparent (invisible) to the user. Rooftop-to-rooftop transmission is now being tested, and the introduction of the 32-bit microprocessor is likely to spur the use of satellites by demonstrating the inadequacies of wired systems.

It will however be necessary for capacity to be developed to handle this kind of transmission at the receiving end. Ground stations are distributed across the country, but high speed traffic control nodes are needed to distribute the communication to these ground stations. In other words, the highway is in place but the cloverleaf remains to be built. Fibre optics are expected to be used extensively to provide such high capacity local loops from ground stations, thereby rendering the satellite suitable for interactive communications.

Graphics and voice recognition technology development are also crucial because they are the key to managerial acceptance of office automation. The manager is heavily dependent on pictorial expression as a shortcut to comprehension, and rarely wants or knows how to type. As with satellites, both of these technologies will receive a boost from more powerful microprocessors. Highly sophisticated graphics display is now possible, but interactive communication of graphics is still difficult. As for voice recognition, a survey of the latest Stanford Research Institute (SRI) publications on computing shows a full half to be on this subject. Very limited voice recognition is already available. The video disk, which stores 50,000 pages of information on each side and costs about the same as an ordinary record, is beginning to revolutionize information storage.

Significantly, recent data processing publications have been focusing on interactive communications and small systems as well as the use of satellites and cable.



#### 4.6 Economic Influences

Cost trends reported in the previous Annual Review remain valid. Conventional office communications activities are becoming steadily more expensive as people costs increase, while the price of innovative techniques falls rapidly. Meanwhile the cost of the technology continues to drop. It is predicted that the 64-bit microprocessor will be available for \$2.00 in 1986, meaning that the cost of an intelligent, multifunctional terminal could well be \$6,000 in 1980 dollars compared to the current \$10,000 cost of a simple word processing system capable of handling only limited text processing.

Continuing pressure on government as well as industry to bring costs under control will impose the use of this technology. With office automation costs falling at 10% to 20% per annum, some predict that present office worker capitalization levels could double by the mid 1980's, mainly due to word processing. It is however not certain to what extent and at what rate the savings potential of new office automation technologies will be exploited. This will depend on the extent and timing of resource crises and on the rate at which management understanding of the savings potential improves. Although generally agreed to be very high, the full savings potential is as yet far from clear.

A recent study by Booz, Allen and Hamilton predicts that effective use of the new technologies could result in gross annual savings of more than \$300 billion in the direct cost of U.S. white collar workers by the end of the decade. On this basis gross savings in Canada would be over \$30 billion a year. Other analyses would probably yield different results. Conscientious work in this field is still rare and results are very few. There is no accepted methodology to guide researchers since the circumstances are unprecedented. All serious research however defines productivity, cost and benefit in much broader terms than heretofore and attempts to develop new measures for each. Social impact on the global and organizational levels is a major component of analysis. Section 12 examines one approach to developing such a methodology.

The only way to produce definitive answers is by gaining experience. Management is learning that it must be prepared to experiment with the technology if it is to understand all its implications. In doing so it should monitor requirements for change in personnel, training, organization design, procedures and so forth and account for their cost. As the results of such practical research in the government become available they will be published in the Annual Review.

The inadequacy of traditional theory to explain what is happening in the economy is indicative of a transition to a new type of economic and social order in which information will acquire a monetary value and growth will be defined in social as well as financial terms. In this new environment lack of information will be equivalent to lack of money.

#### 4.7 Social Influences

It is now generally accepted that we are in the process of transition to a new social order in which information is the key commodity. Most observers assume the long range prospects to be highly desirable because they imply further expansion of human potential. At the same time, a majority sees in the disruptions and confusion of contemporary life only the beginnings of a painful adjustment period about which little is certain. We are experiencing accelerated evolution, and evolution is stressful. Few venture to predict the precise nature of the impact of information technology on society and vice versa. It is however known that jobs, education and organizational and social structures will be profoundly affected, and that the effect will be felt by all nations.

There will be both positive and negative effects on employment opportunities. Whole categories of jobs will disappear. Many of these, such as copy typist, filing clerk, messenger, mailroom and communications centre staff now provide the entry level for less educated workers. A 14% decline in the number of junior management in the U.S. over this decade is predicted by some forecasters, influenced in part by the automation of routine decision making. Many professional jobs are expected to be downgraded for the same reason. On the other hand, new jobs will be created, their variety limited only by the imagination. Among those forecast are "knowledge engineer" and "information resource manager". A new type of entrepreneur is expected. All office jobs will be redefined in terms of their relation to information, and "information support" will develop as a new function with a new career path. Those who lose in the transition process will likely include the less educated and much of the personnel who now operate at the interface between the technology and the user. Women may be particularly hard hit. Those who gain will be the flexible and the willing to learn.

Over time this process will likely involve considerable job dislocation and perhaps the elimination of certain classes of work, but it is uncertain what will be the ratio between jobs created and jobs displaced. Many attempts to predict this have been made in recent years. The optimistic view tends to be shared by the U.S. and Japan while the pessimists tend to be Europeans, led by the British. A survey conducted for the Department of Communications in 1979 by the Institute for Research on Public Policy concluded that there are too many unknowns at this point to justify either optimism or pessimism. This said, it would be grossly inappropriate to set the issue aside. A recent study of historic trends in Europe conducted by Mackintosh Consultants Ltd. demonstrated that productivity-enhancing office innovations have consistently created jobs. It also concluded that this trend was unlikely to continue, since microelectronics are changing fundamentally the relationship between technology, productivity and jobs.

European unions have been participating in the debate for some time, focusing on the need to prepare for the four day week and more part-time work to absorb the jobless. Now there are signs that the debate is reawakening in North America, where it was silenced in 1966 by a purportedly definitive U.S. government report which found no link between technology and unemployment. The significance of this development should not be lost on the federal government, the majority of whose employees are unionized information workers. A sign of growing awareness is the federal-provincial-labour-industry conference on "The Impact of Microelectronic and Communications Technology on the Industrial Work Environment" being sponsored by the Women's Bureau of the Department of Labour in Ottawa in March 1981.

In part answer to the change in the circumstances of work, education will be de-institutionalized and considered a vital element of the job. Software and terminals as well as interactive television will become the delivery media as the cost of traditional education rises and the generation of students schooled with the aid of automated tools enters the labour force. It will become essential to provide opportunities to learn on the job, both to equip workers to fit new jobs and to maintain the interest of an increasingly educated work force. This applies particularly to the many women who are re-entering the work force to find a target for their energies, often to find themselves confined to humdrum office jobs. Automation can play a key role in providing the tools to introduce new creative and learning horizons into the office environment, and thereby to satisfy rising demands for meaningful work. If applied with intelligence and foresight, it has the potential to decrease underemployment.

The most obvious subject for training at this point is in the technology itself, since it is a novelty to all but a small minority of those who will be affected by it. Special training modules on the automated office are now available on cassette from the Public Service Commission Informatics Learning Centre for this purpose.

Organization structures will change to take advantage of the potential for horizontal information flow and individual participation inherent in information technology. Hierarchies and large, centralized units will break down under the influence of distributed computing and the trend to work from home, and less formal, network-based structures will develop. This is already happening amongst members of computer conferencing networks. It will not be an easy transition, since organizations are exceptionally resistant to change.

Social structures will evolve in a manner similar to organizations, thereby satisfying the emerging demand for reinvention of institutions and individual participation in the political process. There is however also a potential for alienation in this development, and there will certainly be novel strains on family and community life. Concern for privacy and security should however decrease as distributed networks develop and equipment becomes available with more sophisticated security control features.

Very little research is being conducted in North America in any of the above areas of potential social impact, although the consensus is that comprehensive pre-impact analysis and an informed public are vital if the right decisions are to be made at the right time.



#### 4.8 Government Research and Development

The federal government's in-house research and development in communications and informatics now accounts for less than five percent of the Canadian total. Contracted work, procurement and other incentives make a larger contribution. Implementation of a five-year plan proposed by the Department of Communications for this sector would raise the in-house share to about ten percent of the total level forecast for 1985. The government contracts out work to both Canadian industry and universities and attempts to foster cooperation amongst the three sectors.

##### Department of Communications

The research and development responsibilities of the Department of Communications are to foster the orderly and timely development of new communications systems and networks in Canada; to help develop a viable communications technology industry; and to promote and protect Canadian telecommunications interests internationally. Thus much of the Department's work is closely linked to developments in the private sector. Areas of concentration in the five-year plan (1980/81 to 1984/85) proposed by DOC which may have an impact on government telecommunications are outlined below.

New Home Communications Services and Telidon - This program is examining technical and financial aspects of alternative delivery systems for new home services, including messaging and information retrieval. The focal point of the work is joint ventures with Canadian industry to develop products to support the Telidon interactive information retrieval technology and to test it in field trials. Of major concern is the need for a large operational data base facility. A request for an additional \$20 million plus extra person-years over five years will be submitted to Cabinet in the fall. If approved, part of the funds will be allocated to various departments for field trials of delivery of service to the public. Approximately 30 person-years are committed to the program in 1980/81.

Office Communications Systems - This program is geared to fostering Canadian competitive capability in the office communications systems market and to assisting business and government in the application of the technologies. Behavioural research is a key component of this work. Government offices could be used as test beds for prototype products and services, and the Government Telecommunications Agency expects to play a leading role in the field trials. In November Cabinet approved funding totalling \$12.5 million for the DOC program. This funding will be complemented by additional expenditures through the Department of Industry, Trade and Commerce's cost-shared programs such as the Enterprise Development Program and the Special Electronics Fund, and through normal office equipment procurement during the life of the program.

Fibre Optics - This technology holds particular promise as a local distribution medium for information transmitted at high speed by satellite, since it can distribute large volumes but occupies little space. The Department is developing standards for fibre optics systems, assisting manufacturers, underwriting field trials and researching policy and regulatory issues. Three person-years are currently allocated to this program, and a total expenditure of \$24 million over five years is planned to keep Canada in the forefront of development work.

Mobile/Fixed Radio Telephone Systems - Radio systems will become increasingly important in the 80's as personal mobile communications become affordable, satellite-based mobile communications become available and manual services are automated. Canadian R&D capability in this area is considered weak and in need of support beyond the eight person-years now allocated. An expenditure of \$30 million over five years is planned.

Information Systems - A five-year expenditure of \$8.15 million and 74 person-years is planned to catalyze industry initiatives in domestic chip supply, large scale data base computers, image communications, voice input and synthesis and other areas, and to conduct behavioural research.

Communication Networks - The Department is committed to supporting research and development aimed at expanding options for network services. The sum of \$700,000 plus \$500,000 from the Department of Supply and Services was allocated in May to a consortium of cable television firms headed by Télécable Vidéotron to develop a pilot system for delivery of new services such as videotex. A major component of the project will be a 250 terminal field trial of Telidon in 1982. Federal funding represents about 25% of the project cost.

Participation in the development of national and international standards for communication between terminals and with various networks is considered crucial to protect and foster Canadian interests. The Department has worked successfully to ensure that international standards for videotex and teletex accommodate Telidon. The need for more participation in international efforts to develop standards for open system interconnection (OSI) and an Integrated Digital Network (IDN) has been recognized.

The five-year plan would increase funding for this program substantially to a total of \$9.3 million.

Space - In September 1980 Cabinet approved studies directed towards defining Canadian participation in a joint program with NASA to develop, launch and demonstrate a UHF mobile-satellite system (MSAT). This satellite would provide voice and data communications to cars, aircraft, ships and compact portable stations operating mainly in rural and remote areas, when launched in 1987. The objective of the program would be to develop the technology and provide a capability for development of applications and interim operational services. The satellite would have transponders at 240-400 MHz and 7/8 GHz for DND mobile and telephone/radio services, 401-403 MHz for sensor data collection, 406.1 MHz for search and rescue and 1.5/1.6 GHz for maritime mobile-satellite services. Federal government requirements originally identified for MUSAT will be met through this new cooperative program. DOC will work closely with federal government departments as well as other prospective users in Canada to study needs, system concepts, cost and the benefits of the proposed program.

A comprehensive set of pilot projects involving governments, industry, universities and special interest groups began in 1979, utilizing the 14/12 GHz capacity of the ANIK-B satellite. This service, leased from Telesat Canada by the Department of Communications, has resulted in the development of expertise in direct-to-home TV broadcasting, telehealth, tele-education, social and scientific applications and technology. Phase 2 of this program,

which begins on 18 February 1981 and continues for 19 months, will permit further service development and provide the vehicle for transition to commercial service by the users. Detailed proposals for Phase 2 have been received from pilot project sponsors, and allocation of satellite and terminal resources to meet the demand is being planned.

By a Cabinet decision in July responsibility for coordination of space policy and research and development was established under the Minister of State for Science and Technology, and the Interdepartmental Committee on Space has now been transferred to that department.

#### Department of Industry, Trade and Commerce

The expenditure of \$19 million was approved in July for support of industry feasibility studies aimed at demonstrating the potential for increased efficiency through the application of microelectronics. This amount is included in the total funding for the OCS Program described on the previous page.

#### National Research Council

The National Research Council has sponsored a Computer-Aided Learning (CAL) program since 1967 in close cooperation with Canadian educational and training centres. The technology developed is now being transferred to industry, and steps have been taken to ensure compatibility with Telidon. A cooperative federal-provincial plan for implementation of CAL in education could result in research and development expenditures of up to \$50 million over the next five years.

University Research - The Department of Communications funds university research in the socio-economic, engineering and systems fields. In 1980/81 it will sponsor 45 research contracts worth \$1 million at Canadian universities. Included are studies on the impact of information technology in Canada, office communications, teleconferencing, data base management systems for videotex, the use of telecommunications to enhance public access to government services, and high level computer communications protocols.

Reports are available from the Government Telecommunications Agency on research projects listed in the previous Annual Review (See Appendix F - Reading Guide). Of these, the reports on telecommunications and decentralization and on word teleprocessing interface are of general interest. The latter deals with the current extent of compatibility between five makes of word processors.

Other branches of the federal government provide significant support for university research and development in communications and information, notably the Natural Sciences and Engineering Research Council, which recently established a strategic grants program in communications. This program is expected to grow to a \$3.5 million budget in two or three years.



#### 4.9      Standards

Standards which apply to the use of telecommunications in the federal government originate at the national and international levels as well as within the government itself. Just as foreign and international standards are fully considered before a Canadian standard is developed and are sometimes adopted wholesale, so national standards are considered by the federal government before it develops its own. Under Treasury Board Canada guidelines, Canadian voluntary telecommunications and data processing standards can have compulsory status in government purchasing on the recommendation of a designated federal interdepartmental standards body such as the Government EDP Standards Committee (GESC). Directories of federal government standards are available from this committee and the Canadian Government Standards Board. The chart in Appendix D (Status of Standards) depicts the organizations involved in the process of standards development and their relationships. The significance of the role of the federal government within this structure is apparent.

As a signatory to the convention of the International Telecommunications Union, Canada undertakes to apply ITU Regulations in its own government departments as well as applying them, as appropriate, to operating entities. In addition, the General Agreement on Tariffs and Trade (GATT) requires that federal departments preparing specifications for invitations to tender for telephony or data services and equipment make use of standards developed by their national standards organizations, where these are members of the International Organization for Standardization (ISO). The 1979 GATT calls for the voluntary national standards of signatory countries to be harmonized with ISO and IEC standards and to be used in national legislation and regulations as well as government purchasing. The European Economic Community adheres closely to this principle to reduce non-tariff barriers between its member states.

The issue of which body should be allocated the responsibility for defining telecommunications standards has arisen both in the Canadian Standards Association (CSA) and the federal government recently due to the convergence of telecommunications, data processing and office equipment technologies. The CSA has chosen to expand the mandate of its National Committee for Computers and Information Processing (CIPOM) to handle the matter, and the possibility of doing likewise with the mandate of the GESC is being discussed. Integrating responsibility for these three areas is a virtual necessity given the extent of overlap between them. An example of what could result is the extension of the performance standard for data communications to cover general telecommunications performance criteria for use by departments and the Government Telecommunications Agency in developing purchasing specifications.



Work at all levels of the standards community is accelerating rapidly to keep up with developments in information technology. A concerted effort is being made to agree upon standards for new services such as videotex before the market is inundated with incompatible equipment, as was the experience with EDP. It is heartening to note that Telidon, the Canadian version of videotex, was accepted on an equal footing with the British Prestel and the French Antiope systems by Study Groups of the ITU International Telegraph and Telephone Consultative Committee (CCITT) meeting in Montreal in June, and will now be recommended to the Plenary Session of the CCITT in November 1980 as the basis for an international standard. Procedures are also being developed for the drafting and approval of a national standard for videotex.

The CCITT and the ISO are working intensively and cooperatively to complete the definition of an Open Systems Interconnection (OSI) architecture which will permit computerized devices of all kinds - from the traditional main-frame to the multifunctional terminal - to communicate as easily as telephones do now. This work is of fundamental importance. Departments embarking on major network development projects requiring the eventual linkup to other departments, organizations outside the federal government and/or systems outside Canada should be monitoring OSI carefully.

When the CCITT meets in Plenary session in November it will be approving a total of 26 recommendations on data communications developed or provisionally adopted over the four year period since its last meeting. These will be published in early 1981. The status of the X and S series recommendations (including the X.25 packet switching protocol) as at the time of writing is included in Appendix D.

#### 4.10 Summary

It can be concluded that the effective and early application of information technology in government is a necessity. The task of management and planners must be to ensure that its positive, rather than its negative, potential is exploited, and in such a way that the benefits are passed on to the country as a whole. This calls for a much broader perspective on the government's communications system and a much greater sense of urgency than have been demonstrated to date. It calls for a commitment to cooperative effort and the willingness to experiment. These are characteristic of the posture of governments in most other Western industrialized nations vis-à-vis the information society.

## 5. Survey of Carriers

It is helpful to view developments in the common carrier sector through the following perspective. First, the range of transmission alternatives available for business communications will grow substantially during this decade, and this growth has already started. Traditionally the choice for the user has been between the telephone and telegraph networks operated by TCTS and CNCP respectively. Voice and facsimile traffic were handled over the telephone network, most message traffic over the telegraph network (i.e. via telex), and data traffic over both. Interconnection between Bell Canada and CNCP networks, permitted since 1979, facilitates data exchange as well as the linking of private line voice services. Now the cable companies are making a bid for business traffic, offering the potential advantage of high speeds and low cost. Rooftop-to-rooftop satellite communications promise the same advantages and are also being tested, although commercial exploitation of this technology is closer in the United States.

Second, all forms of communication, including voice and image, will soon be digitized. Thus one digital network will be able to support all types of traffic. By 1985 the telephone network should be such an Integrated Digital Network (IDN). Thereafter it can be expected that transmission services will be integrated and an Integrated Services Digital Network (ISDN) offered.

Third, network development will take place within the context of the Open Systems Interconnection (OSI) architecture, a set of standardized information exchange procedures being developed by the U.N. International Telephone and Telegraph Consultative Committee (CCITT) and the International Organization for Standardization (ISO) to ensure that computers and terminals will be able to communicate as easily and universally as telephones. The architecture is to be formally defined by the CCITT in November 1980.

Fourth, packet switching is becoming available on all carrier media, including cable, because it provides in general a higher speed, lower cost, more secure alternative to the traditional circuit and message switching, as well as a facility for making different types of hardware and software compatible. For this reason packet switching was chosen for Euronet DIANE, the European Community network designed for the international exchange of scientific and technical information.

Within the above context it will be noted that both common carriers are preparing to offer electronic mail services to link a variety of terminals. Bell Canada plans to file tariffs for its Envoy 100 service in late 1980 and to introduce it in mid 1981. This will be a usage sensitive packet-switched service supporting ASCII terminals. Service between word processors will be offered at a later date. CNCP plans to offer Infotex in 1981 to link a range of word processors to each other and the existing telex network as well as to the teletex network being developed according to CCITT guidelines.

## 6. Survey of Equipment Suppliers

The technology with which to automate office communications at low cost and in a manner acceptable to the user is available now, but it has not yet been assembled into a range of products which meet these criteria. Consequently many requirements are still met only by outdated equipment, or not at all. Comprehensive large scale office automation systems incorporating word and data processing, electronic mail, data base and so forth are becoming available from IBM and smaller houses such as TRW, with its Integrated Electronic Office, but Canadian products fitting this description are just starting to be announced.

Word processors are regarded as the precursors of the multifunctional terminal or workstation which will be the basic component of the automated office network. This is so because of their large installed base and growth rate and the fact that they are more "user friendly" than data processing terminals. In fact, although word and data processing have begun to merge on both types of equipment, the development is proceeding faster from the word processing side.

Word processors are marketed either as stand-alone (operating solely on the processing power built into the machine itself) or clustered (operating in distributed mode or under a shared logic discipline). Stand-alone units accounted for 90% of the 1979 worldwide installed base, but clustered systems, particularly shared logic systems in which a central processor can support up to 32 terminals (the norm is 4.8), are growing far more rapidly because they offer greater capability. Between 1978 and 1979 the number of clustered units installed grew 86% compared to the 20% growth in the number of stand-alone units. This is however an interim stage in the development of a true network environment, in which powerful stand-alone terminals or workstations linked by communications for messaging will be the norm.

Communications are considered the binding agent in office automation, as evidenced by the level of interest in electronic mail. This is however still an underdeveloped feature and not practical on low cost systems. Over half the word processors now sold in North America have communications capability, but less than one quarter of buyers use this feature, and fewer use its full potential. The reason is the extremely limited capability now offered. A study of the extent of communication possible between five different makes and models of word processor, completed for the Department of Communications in March 1980, revealed that neither character sets nor instruction repertoires nor internal coding structures are compatible. Thus communication without loss of instructions or data is possible between word processors of the same make and model, but not between different makes or even different models from the same manufacturer, regardless of whether a common protocol is used. This deficiency is most evident in intraoffice communications (e.g. between two floors of the same building), which are not now supported by other electronic means such as telex.

Similar compatibility obstacles have plagued users of computers and are still not resolved because it has not been in the interest of manufacturers to do so. The characteristics of the new form of information technology are such that the user will determine what is offered, and full communications will become a standard feature on office systems, probably within five years.

Current word processors are limited in other ways. For example, none is capable of operating in English and French character sets simultaneously, so the concurrent preparation of texts and bilingual communication which are vital in the federal government are not possible.

During the next two years the evolution towards multifunctional capability will become much more evident. Forms processing and graphics as well as data base capability can be expected to be integrated into low cost office systems, and management-oriented equipment will emerge. Facsimile will be an important form of electronic mail until full communications, including graphics, is available on multifunctional terminals, at which time it could be replaced in most applications by this lower cost alternative. Leasing is likely the best option in the interim. Meanwhile suppliers of traditional office communications equipment will take steps to forestall obsolescence by providing facilities to link their installed base to the new generation of equipment.



## 7. Survey of Information Providers

The commercial market for on-line access to data bases started growing rapidly only at the end of the 1970's, but is expected to quadruple to \$4.3 billion in the United States by 1985 as demand for information increases and business and individuals become familiar with the range of offerings and means of access. The attraction is the speed with which information can be located and digested by the user.

According to latest figures, there are 161 registered "information providers" in North America, including both vendors and brokers, providing access to over 400 data bases in the U.S. alone. These contain both information and software programs. Typical is The Source, a U.S. based firm which provides users in both Canada and the United States with access to approximately 30 data bases and 2,000 programs as well as message services for a once-only fee of \$100 plus charges. Charges are \$2.75 per hour in the U.S. and somewhat higher in Canada.

Among the most visible information providers in Canada are Infomart, which acts as a broker, and Infoglobe, which provides access to the complete daily editions of "The Globe and Mail" published since 1978. By late 1980 each edition will be accessible electronically at the same time it is printed, thus providing an electronic publishing service. The Canada Institute for Scientific and Technical Information (CISTI), a federal agency operated under the aegis of the National Research Council, offers access to services such as Med-Line (medical data bases) via its CAN/OLE (Canadian On-Line Enquiry) system.

Euronet DIANE (Direct Information Access Network for Europe) is the focus of European developments in this field. Officially opened in February 1980, this network is a joint venture of the Postal and Telecommunications administrations of the nine European Community (EC) member states and has been under development since 1971. Twenty-three independent computerized information services, or hosts, provide access to some 150 data bases of scientific, technical, social and economic information via the network. Given the nature of this information, issues of transborder data flow have been largely avoided. A key design feature was the use of packet switching to ensure low cost, reliable access through entry points in each member country. This network will be extended to Switzerland by the end of 1980, and further extensions outside the EC, including to North America, are envisaged. Euronet DIANE is viewed as the cornerstone of a European information industry and will therefore be modified over time to accommodate developments such as office automation and videotex.

The commercial data bases described above are normally accessed via a wide range of terminals, including personal computers and communicating word processors. Some information providers, such as CISTI, will conduct searches and mail results to those without a terminal. The use of interactive and broadcast television technology (videotex and teletex) for information storage and retrieval is minimal now but expected to grow since it provides graphics communication capability not available from current data bases and computer terminals. So far commercial service is available only in the United Kingdom via the Prestel service operated by the British Post Office, but trials of Telidon are under way in Canada and will start soon in the

United States and Venezuela. The major obstacle to this approach has been a standoff between potential terminal manufacturers and information providers. The former are reluctant to produce the equipment required to modify the television set for interactive use until data bases are available for access, while the latter are reluctant to establish data bases until a means of access is available.

Organization of federal government data bases for public access under the new Freedom of Information legislation is seen as a basis for the practical application and refinement of Telidon. This work has begun. Chapters 420 and 425 of the Treasury Board Administrative Policy Manual, developed by a Treasury Board Task Force in preparation for the enactment of this legislation, deal respectively with procedures for individuals to access information about them held by the government and with procedures for departments to register public information banks.

The DSS Task Force on Service to the Public, whose mandate was confirmed in August 1980, has also been working in close co-operation with GTA to provide the public with easier access to government information and to advise departments on how to communicate with the public. Accomplishments include the establishment of separate listings of government telephone numbers in public directories and CORE listings for toll-free access to services in greatest demand. Although the telephone network is the medium through which the Task Force is now offering improved access to government information, alternative delivery systems such as Telidon are being investigated for inclusion in the program on an experimental basis. Telidon capability will be incorporated in several government service bureaus across Canada by early 1981, starting with Edmonton.

Some observers foresee the development of an information "cottage industry" in which individual entrepreneurs will design information products and make them available via a network for a fee or royalty. This has not materialized so far, largely because routines for providing information are still complex and because means have yet to be devised to extract payment for the use of automated material.

## 8. Analysis of Departmental Plans

### General Remarks

The basis for this analysis is information submitted to Treasury Board Canada by 52 departments and agencies in the Annual Telecommunications Report for 1979/80. The report covers past year expenditures (analyzed separately in Appendix A), and included a requirement that respondents submit five-year systems plans. It also provided an opportunity for departments to comment on matters such as the quality of service provided by carriers and the Government Telecommunications Agency, and to make recommendations on how the management of telecommunications could be improved. The deadline for receipt of the report was moved ahead to June 30 to permit the Annual Review to be published in time to assist departments in the next planning cycle.

There is evidence that Telecommunications Coordinators, who are responsible for preparing the report, benefited to some extent from seminars held by DOC in February to explain reporting requirements. A modest overall improvement in the quality of response over the previous year was registered. Less than half of respondents - mainly the very large and very small users - met the deadline, but most replied soon thereafter. On the other hand, only twenty-nine respondents (56%) submitted systems plans. Those reporting represented 88% of the total telecommunications expenditures. Substantive plans were submitted by 19 respondents (37%) compared to 10 last year, and nominal information was provided by 10 (18%) compared to 25 last year.

The quality of information provided varied greatly. Profiles of departmental requirements provided by half the respondents were particularly useful because they established a context within which plans could be understood. Most major and some minor users showed evidence of planning, and a few were in a position to project developments along with associated costs and personnel requirements to the end of the forecast period. However, eight (33%) of the 26 departments now spending more than \$1 million a year on telecommunications were among those who submitted no information on plans.

Some major departments indicated that they were aware of the extent to which new information technologies could reduce their costs and were actively investigating how to apply them. Some had already achieved substantial savings by doing so. The majority of those who provided a forecast expected their costs to remain constant in real terms except for increases resulting from higher tariffs.

Worth noting also is the fact that the number of major changes foreseen (i.e. those which will cause costs and/or personnel requirements to rise or fall by more than 10%) is only slightly more than half the number recorded last year. This may be due to uncertainty engendered by recent frequent changes in government and/or a more studied attempt at forecasting.

The proportion of major changes recorded for each category (i.e., voice, record message, data, other data, image and video) is similar to that of last year, although data overtakes voice in the lead. Most of the changes reported are for basic administrative communications, and in fact this is the only form of communications system used by the majority of departments. Relocation plays less of a role as a source of change than last year, and plans to expand user access to data bases become an important factor.

Outside the very large user departments systems planning is still in its infancy. The reason is largely lack of expertise, not only in the emerging integrated technology and its applications, but also in basic telecommunications. This is particularly true in the regions. Thus it is disappointing to note that only nine respondents report that funds are available to provide training for telecommunications personnel. Furthermore, virtually no increase in the numbers and rank of personnel is forecast, despite the fact that most departments have no management-level capacity in telecommunications.

On the other hand, there are signs that management is taking more active interest in telecommunications. Thirty reports were submitted under the signature of a director or more senior official and seven respondents (13.5%) reported that departmental policies and procedures for telecommunications management had recently been adopted or were soon to be adopted. A handful of reports were prepared and submitted by computer services personnel, but most were handled by administrative officials.

Response to the Appraisal section of the report focused in general on quality and adequacy of service, problems encountered in accounting for and reporting expenditures and personnel issues. Most respondents were satisfied with the service received from both the Government Telecommunications Agency (GTA) and the common carriers. Some had however been disappointed. Use of the GTA-operated Government Data Network (GDN) was considered unnecessarily complex by some because of paperwork, inaccurate directories and excessive lead times. Both TCTS and CNCP were criticized by a number of departments for slow action on service orders, especially where modems and leased lines were concerned.

Many departments reported difficulty in identifying costs adequately and on time for inclusion in the annual report. This difficulty arose from an inadequate financial coding system, insufficient billing information from GTA, an earlier deadline and lack of regular monitoring of expenditures by central authorities within departments. Several departments have developed their own, more detailed coding systems to improve cost visibility ad interim.



Many departments commented on personnel problems. Classification and training are inadequate, career paths non-existent outside the military and police environments, and the numbers and level of responsibility of telecommunications personnel do not reflect the amount of money spent. This contributes to the difficulties experienced by many departments in completing the annual report. It also ensures that little expertise is available for sharing with other departments. Nonetheless Correctional Services offers capability in the definition, specification, procurement and installation of electronic security systems and CCTV visual surveillance equipment through its Telecommunications Electronics Division, and DOC will assist departments in developing secure transmission systems as well as provide advice in the areas in which it conducts research (see Section 9).

Departmental recommendations have been summarized and passed on to appropriate officials for action. Action already taken by central agencies to improve cost visibility and personnel administration is reported in Appendix A.

In the next part of this section major changes reported by departments are summarized according to the year in which they are to occur, and a brief comparison is made to the findings reported last year. Costs are expressed in constant 1980 dollars.

SUMMARY OF MAJOR CHANGES BY CATEGORY OF TELECOMMUNICATIONS

VOICE COMMUNICATIONS  (telephone, radio, switchboard, intercom, paging, public address, automatic answer, teleconference, etc.)	NUMBER OF MAJOR CHANGES					
	80/81	81/82	82/83	83/84	84/85	TOTAL
	9	9	6	4	6	34

As in the previous year the largest number of major changes foreseen by respondents was in the area of voice communications, particularly radio, as were the largest forecast expenditures. In contrast to the previous year, few of the changes planned were the result of relocations and more were directed towards providing better service at lower cost. Changes were reported by only nine departments, compared to 25 in the previous year.

The previous year's forecast for voice remains more or less valid because of the consistency in reporting by the RCMP, which has accounted for most of the expenditures reported for the two years. The RCMP relies on radio for most of its local voice communications throughout the country. It plans to spend a total of some \$47 million over the five year period on 21 projects to upgrade, extend and interconnect local radio networks. This total includes capital and personnel but excludes annual rentals, and is distributed approximately as follows: \$4.5 million in 1980/81, \$6 million in 1981/82, \$14 million in 1982/83, \$16 million in 1983/84 and \$8 million in 1984/85.

Customs and Excise plans to install a nation-wide radio network over the five year period to increase the safety of customs officers, improve contact with police forces and provide communications for border patrol units. Work has already started with the installation of base stations and mobile units for detector dog services, and will proceed at an estimated total cost of \$3.25 million allocated as follows: \$52,000 in 1980/81, \$850,000 in 1981/82, \$600,000 in 1982/83, \$850,000 in 1983/84 and \$800,000 in 1984/85.

Transport Canada reports that the Coast Guard is expanding its VHF radio coverage to provide mariners with improved safety and public communications such as direct ship-shore telephone and telex service. This project will require the acquisition of a large number of dedicated voice-grade lines. Voice-grade lines for air traffic control purposes will cost Transport a further \$294,000 over the five-year period at current estimates.

Fisheries and Oceans intends to refurbish the HF, VHF and UHF radio systems serving Fisheries Management in the Pacific Region in 1982/83 to improve coverage of the coastal and interior areas.

As for conventional telephone service, six departments (Employment and Immigration, External Affairs, Fisheries and Oceans, Taxation, Science and Technology, and Veterans Affairs) report that they are considering or planning to install PBX (private branch exchange) systems. This underlines the need for guidelines on the acquisition and maintenance of small-scale electronic switching systems.

Taxation intends to change its long distance taxpayer information service from the Zenith system to Inwats where the latter is available, following a GTA consulting study which has revealed that some \$800,000 per annum could be saved and customer service improved by doing so. At the same time it plans to redesign telephone systems at Public Enquiry Sections to permit calls to be passed directly to desk officers, thereby further reducing line costs.

External Affairs is proceeding with a major five-year equipment replacement and redeployment program launched in 1978/79. This involves replacement of telephone systems at foreign posts with crown-owned equipment and the installation of toll denial devices to control direct distance dialling from such posts. Both measures prove cost effective within two years of installation. A new telephone system, probably SL-1 based, will be purchased in 1981/82 at some \$260,000 for installation in Tokyo in 1982/83. The new system is to provide a more flexible and secure internal telephone service and permit future expansion. Similar systems have already been acquired for Paris, New York and Washington and will be installed by 1980/81. The Department's consulate telephone systems in the United States have been studied, and tentative findings are that savings could also be achieved in some of these cases by the installation of crown-owned equipment. Should further analysis confirm these findings the installation of Northern Telecom Pulse 120 or equivalent systems will be recommended for an annual saving of over \$60,000.

External is installing 20 toll denial units at selected posts between 1980/81 and 1982/83 at an estimated installed cost of \$8,500 each, and anticipates savings of much more than this each year as a result.

In all, expenditures on voice systems planned by External Affairs amount to approximately \$430,000 over the three years to 1982/83, concentrated in 1981/82.

Customs is installing \$20,000 worth of intercom systems at 15 border crossings to link up with U.S. customs, and will spend a further \$70,000 over the next two years to extend the systems.

Two departments only - Labour and Science and Technology - report that they are studying use of the GTA teleconferencing facility.

Taking all reported forecast expenditures into account, a total of \$53.95 million will be spent on voice over the five year period in addition to current expenditures. Peak years will be 1982/83 and 1983/84. Most of the costs are capital-related. They will be offset in part by savings achieved through the use of the new equipment.

RECORD MESSAGES  (teleprinter, communicating word processors, telegram, cable, courier, etc.)	NUMBER OF MAJOR CHANGES					
	80/81	81/82	82/83	83/84	84/85	TOTAL
	7	4	4	2	3	20

A total of seven departments forecast a major change or changes in their record message systems at some time during the five year period, compared to eleven in the previous year. The principal reason for change appears to be a desire to improve efficiency, whereas previously it was relocation and the establishment of new offices.

Most of the changes foreseen involve communicating word processors, although telex is still the focal point in some departments. Seventeen departments report that they are studying the feasibility of establishing an in-house word processor network or will be doing so in the next two years. (Note the discrepancy between this figure and the number reporting major change.) Most departments spending over \$1 million a year on telecommunications are included in this group along with a few others who spend considerably less. The majority have already installed some form of communicating word processor and intend to use the capabilities of this equipment as their point of departure. Thus the studies will be practical in the main.

A number of the feasibility studies are components of comprehensive reviews of non-voice communications, including telex and facsimile. Such is the case with the Auditor General, Employment and Immigration, External Affairs, Indian and Northern Affairs, the Post Office, Supply and Services and Transport. This indicates a growing awareness of alternatives.

External Affairs is examining the possibility of using specially designed word processors or secure facsimile to provide secure communications to some of its consulates in the U.S. Most record communications will continue to be handled by telex (i.e. the Department's Canadian Diplomatic Communications Service - CDCS). The average annual growth rate of telex traffic on the CDCS has been 18.3% since 1977/78, but is expected to fall to 8% hereafter. Where commercial telex facilities are unreliable or too costly, mainly in the Middle East, the Department operates radio teletype systems. It plans to purchase four such systems in 1980/81 at a total cost of \$380,000, which will be offset in the first year by savings on telex and leased line costs.

Defence is the other department to forecast major expenditures for record communications. The Defence Data Network (DDN) will be automated in the current fiscal year to provide secure communications at sufficient speed and volume for departmental needs. Costs for operating the network will rise from a 1979/80 total of \$600,000 to \$816,000 in 1980/81 and \$1.03 million in each of the two years following.



Transport intends to replace the model 35 ASR teleprinters now used in its ADIS network prior to 1983.

Two departments - Justice and Taxation - report having transferred their telex traffic to the Government Data Network this year, and both Fisheries and Oceans and Indian and Northern Affairs report plans to do so.

The sum of all reported forecast expenditures for record message systems is approximately \$3.4 million over five years, or about 5% of that reported for voice. Figures reported apply only to the first three years of the period.

DATA COMMUNICATIONS  (computer-to-computer and terminal-to-computer systems)	NUMBER OF MAJOR CHANGES					
	80/81	81/82	82/83	83/84	84/85	TOTAL
	7	7	7	5	5	31

A total of eleven departments expected a major change or changes in data communications at some time during the period, compared to sixteen the previous year. Most of the major changes reported concern the extension of existing network systems and the provision of information retrieval (data base) capability rather than pure data processing.

The RCMP will begin to implement KEIRJE (Key Entry Information Remote Job Entry) in 1980/81 and will eventually integrate this system into PIRS (Police Information Retrieval System), of which implementation will begin in 1981/82. The projects will both span five years and cost a total of \$1.63 million and \$21.9 million respectively.

Employment and Immigration implemented the first phase of its FOSS (Field Operational Support System) in January, 1980 to provide Immigration officers across the country with immediate access to information of interest to the Department. The network consisted of 13 terminals and an on-line data base updated weekly in batch mode. Sixty-nine more terminals are to be added by April 1981 and the data base will be expanded. Studies will be conducted in 1981/82 on the feasibility of decentralized data entry and case file support. Given a successful outcome, the network will be expanded to support these requirements. The network design will be evaluated and new technologies considered for incorporation in it. Annual expenditures for the operation of the system are expected to rise from \$137,000 in 1980/81 to \$450,000 in 1984/85 and total \$1.59 million over the five years.

Customs and Excise reports plans to extend its LINDA (Laboratory Network for Data Acquisition) system to the regions in 1981/82 at the cost of \$60,000 to provide clients with direct access to the data base. Similarly, it intends to establish a Client Profile System in 1981/82 to provide excise tax information to the public, and to expand the capability of the information retrieval system it makes available to other departments.

The National Library is proceeding with implementation of the DOBIS and UTLAS systems according to the plan described in the previous Review. Further information on this project is to be found in next section ("Major Departmental Undertakings").

The Services Administration of DSS anticipates an increase of 66% in data communications costs in 1980/81 due to the extension of existing customized systems such as the Central Accounting System and the decentralization of

the Canada Pension Plan System. Costs will rise from \$361,000 in 1979/80 to \$600,000 in 1980/81, then remain relatively constant, for a five year total of \$3.28 million.

The Supply Administration plans to establish a nation-wide distributed processing network which will reduce current data communications traffic and thereby make room for new types of traffic. It is expected that communications costs will increase by only 8% from 1980/81 to 1981/82 and decrease by 1982/83.

Transport will spend substantial additional funds on the lease of new circuitry for JETS (Joint Enroute/Terminal System) and for radar in Ontario. The total cost of \$1.01 million will be evenly distributed over the five-year period.

Packet switching is reported to be in use in the Employment and Immigration FOSS system, and Customs plans to convert to packet switching to save money.

The total reported planned expenditures for data communications are \$10.29 million over the five years.

	NUMBER OF MAJOR CHANGES					
	80/81	81/82	82/83	83/84	84/85	TOTAL
<u>OTHER DATA COMMUNICATIONS</u>						
(data teleprinter & display, telemetry systems, etc.)	2	4	2	1	2	11

Major changes were reported by four departments, namely Communications, External Affairs, Fisheries and Oceans and Transport. None was substantive and no analysis is possible.



IMAGE TRANSFERS  (facsimile, telephoto, telewriter, etc.)	NUMBER OF MAJOR CHANGES					
	80/81	81/82	82/83	83/84	84/85	TOTAL
	7	5	3	2	4	21

Eight departments reported plans for major changes in image transfer systems at some time during the period, compared to 12 in the previous year. This is the smallest drop in the number of changes reported for any category.

Despite the projected limited life span of conventional facsimile equipment, 10 departments report that they are considering introducing this form of communications or upgrading current facilities. This can be attributed to the fact that more advanced transmission technologies have yet to be made available in the form of products for large scale use.

Departments reporting plans to introduce or expand facsimile service are Fisheries and Oceans, Health and Welfare and Taxation. This option is being considered along with others by the Auditor General, External Affairs and the National Parole Board. The Post Office and Veterans Affairs are reviewing their facsimile installations and Fisheries and Oceans will be doing so in 1981/82.

Of the above departments, Health and Welfare, a highly decentralized department, has made limited use of facsimile to date in its Income Security Programs Branch to transmit documents between high volume regions. It has now decided that volume should not be the sole criterion for use of such equipment. In the interest of providing uniform service across the country it plans to install facsimile equipment in all regional offices and those of its four field Assistant Directors General in 1980/81. An additional \$100,000 per annum will be required for this service.

Taxation is studying the feasibility of installing transmit-only facsimile at all 26 District Offices, receive and transmit facilities at six Taxation Centres and receive facilities at six area Public Archives for the purpose of transmitting "Request for Taxpayer Records" forms. An average daily volume of 600 forms would be transmitted from each District Office to the appropriate Taxation Centre, and 240 from each Centre to the area Public Archives. Volumes of this size would have a large impact on telecommunications costs, but figures are not available at this point.

External Affairs is studying the feasibility of using facsimile or word processors to provide secure communications with consulates in the U.S. The cost is estimated at \$184,000 in 1980/81, \$200,500 in 1981/82, and \$200,000 in each of the next two years, for a total of \$784,500.

Departments planning to upgrade their facsimile equipment to digital are Employment and Immigration and Indian and Northern Affairs. A national study is under way at EIC and expected to result in the gradual conversion to digital across the country to handle higher volumes of traffic at lower cost. Indian and Northern Affairs is looking to sub-minute machines to reduce the substantial long distance charges incurred because 70% of its message traffic by volume is handled by facsimile and because traffic to and from northern units must use commercial lines.

The sum of all reported forecast expenditures for image transfers is approximately \$1.28 million over five years, peaking in the current year. This is very low by comparison with voice, record messages and data, and cannot be regarded as reliable.

VIDEO COMMUNICATIONS (television, cablevision, video phone, cameras, receivers, recorders, etc.)	NUMBER OF MAJOR CHANGES					TOTAL
	80/81	81/82	82/83	83/84	84/85	
	1	1	2	1	2	

As in the previous year, the fewest changes reported were in the area of video communications: a total of only four departments foresaw changes, and of these only two appear to be major.

Slightly more supporting information is available this year. Employment and Immigration reports that its New Brunswick Region is using video communications to record and receive training and development programs, while Saskatchewan Region will be renting a video transmission screen to handle its inventory of office furniture and equipment.

Transport plans to lease a video channel between London airport and the Toronto air traffic control centre starting in 1982/83 at an annual cost of approximately \$160,000 to transmit primary radar video. It is studying the possibility that such transmissions could be digitized in a cost effective manner by that time.

Fisheries and Oceans is including video in a major overhaul of its communications system planned for 1984/85.

The National Library expects to begin interfacing its Library Network with developing videotex networks starting in 1983/84 to provide for the widest possible access to its information.

Figures available for video are those provided by Transport only, indicating a total expenditure of \$507,000 over the last three years of the period.

SUMMARY OF MAJOR CHANGES BY YEAR

CATEGORY	FIRST YEAR 1980/81
VOICE	9
RECORD	7
DATA	7
OTHER DATA	2
IMAGE	7
VIDEO	1
TOTAL	33
AVERAGE FOR THE FIVE YEARS	25
NO. RESPON- DENTS	16

The total number of major changes reported for 1980/81 is 32% above the average at 33. Of the 21 respondents who reported plans for major change(s) over the five-year period, 16 expected a change this year.

As in the previous year, the combined total of "data" and "other data" equals that of "voice". In contrast to the previous year, it is substantially lower than the combined total of "record messages" and "image transfers". This pattern is not continuous throughout the five-year period; reported changes in record and image communications peak in the current year. They remain however more or less on a par with "data/other data" and higher than "voice".

Of the planned expenditures reported, the largest are, as last year, in the voice category at \$4.68 million. This compares to reported expenditures of some \$1.32 million for record messages, \$1.96 million for data communications and \$284,000 for image transfers - a total of \$8.24 million. In each case these figures are the total of those reported by five or fewer major departments.

Most of the expenditures on voice are accounted for by the RCMP radio expansion and upgrading program. Expenditures for the Automated Defence Data Network (ADDN) make up most of those reported for record messages. Half of funds projected for changes in data communications are for expansion of DSS Services Administration systems, the remainder being accounted for principally by Employment and Immigration and Transport.

The most salient feature of plans for the current year is the number of departments who are studying the use of word processors for message communications.



CATEGORY	SECOND YEAR 1981/82
VOICE	9
RECORD	4
DATA	7
OTHER DATA	4
IMAGE	5
VIDEO	1
TOTAL	30
AVERAGE FOR THE FIVE YEARS	25
NO. RESPON- DENTS	11

The total number of major changes reported for 1981/82 is 20% above the average at 30. Of the 21 respondents who reported plans for major changes over the five years, 11 expected a change of some kind in the second year. Thus fewer respondents account for almost the same number of planned changes as in 1980/81. From this point onwards virtually all major changes are reported by a dozen departments clustered in the ranks of the largest spenders.

Planned expenditures reported for this year are \$7.4 million for voice, \$1.09 million for record message systems, \$1.79 million for data and \$300,500 for image transfers - a total of \$10.58 million.

Upgrading of the RCMP radio network accounts for \$6 million of voice expenditures, installation of the Customs radio network for another \$850,000, the purchase of switching systems and toll denial equipment by External Affairs for \$345,000, and cable installation by Transport for the remainder.

An increase in the cost of the Defence ADDN system to \$1.03 million accounts for most of the planned expenditures for record messages.

A \$600,000 data communications expenditure is envisaged for DSS Services systems. Expenditures by the National Library on DOBIS will rise substantially to \$542,000, and Employment and Immigration expenditures on the FOSS network will rise to \$246,000. The remainder of data communications expenditures reported are accounted for by Customs and Transport.

Continuing costs for new facsimile services to be installed by External Affairs and Health and Welfare in the first year constitute the total figure reported for image transfers.

As in the first year the most salient feature is the amount of planned activity in record communications, particularly word-processor based.

CATEGORY	THIRD YEAR 1982/83
VOICE	6
RECORD	4
DATA	7
OTHER DATA	2
IMAGE	3
VIDEO	2
TOTAL	24
AVERAGE FOR THE FIVE YEARS	25
NO. RESPON- DENTS	11

The total number of major changes reported for 1982/83 was marginally less than the average at 24. Eleven respondents - essentially the same as those in the second year - forecast changes.

Planned expenditures for which figures are available are \$15.62 million for voice, \$1.03 million for record messages, \$2.17 million for data, \$300,000 for image and \$160,000 for video - a total of \$19.28 million.

RCMP expenditures for radio networks will rise substantially to \$14.2 million, and Customs will spend \$600,000 on its radio network.

Data communications expenditures reported are primarily for the National Library DOBIS system at \$740,000, DSS Services systems at \$660,000, expansion of the FOSS system by Employment and Immigration at \$360,000, and implementation of the PIRS system by the RCMP at \$225,000.

Continuing costs for facsimile at External Affairs and Health and Welfare account for forecast image transfer costs.

The first figure reported for video is provided by Transport for this year. The sum of \$160,000 will be spent to lease a video channel between London airport and the Toronto Air Traffic Control Centre.

CATEGORY	FOURTH YEAR 1983/84
VOICE	4
RECORD	2
DATA	5
OTHER DATA	1
IMAGE	2
VIDEO	1
TOTAL	15
AVERAGE FOR THE FIVE YEARS	25
NO. RESPON- DENTS	8

The total number of major changes reported for 1983/84 was well below the average at 15. Eight respondents accounted for this total. Few departments are looking this far ahead.

Planned expenditures for which figures are available are \$17.02 million for voice, \$1.78 million for data, \$300,000 for image transfers and \$172,000 for video - a total of \$19.27 million.

Once more RCMP and Customs plans for radio networks are responsible for almost all voice expenditures reported. The sums involved are \$16.17 million and \$850,000 respectively.

National Library expenditures on DOBIS will rise to \$909,000. DSS Services reports \$660,000 planned data communications expenditures for its client systems as in the third year. Employment and Immigration expenditures for FOSS may rise to \$400,000, and Transport will spend \$184,500 to lease lines for JETS and radar transmission. The RCMP will spend \$283,000 on PIRS.

Transport costs for leasing video channels will rise to \$172,000.

CATEGORY	FIFTH YEAR 1984/85
VOICE	6
RECORD	3
DATA	5
OTHER DATA	2
IMAGE	4
VIDEO	2
TOTAL	22
AVERAGE FOR THE FIVE YEARS	25
NO. RESPON- DENTS	9

Possibly because awareness of the time frame for technological change is growing, the number of major changes expected for 1984/85 is higher than for the previous year and only slightly below the average at 22. Nine departments account for the predicted changes.

Expenditures of \$9.19 million on voice, \$2.69 million on data, \$100,000 on image transfers and \$175,000 on video are reported to be planned - a total of \$12.16 million.

As is the case throughout the forecast period, RCMP and Customs expenditures on radio - \$8.2 million and \$800,000 respectively - account for the major share of voice costs reported.

Data communications expenditures are distributed as follows: \$1.09 million for DOBIS at the National Library, \$725,000 for DSS Services client systems, \$450,000 for the Employment and Immigration FOSS system, \$287,500 for the RCMP PIRS system and \$187,500 for line lease by Transport for JETS and radar transmissison.

Health and Welfare will spend \$100,000 on facsimile, and Transport \$175,000 on lease of a video channel for radar transmission.

Fisheries and Oceans reports that its comprehensive review of departmental telecommunications will result in major changes in all categories by 1984/85. Emphasis will be on the use of satellite and mobile communications systems wherever possible. Voice will be either digitized or handled on facilities separate from those used for transmission of text, graphics and data, and key information control centres throughout the department will be equipped with electronic message switching units.



SUMMARY OF MAJOR CHANGES BY CATEGORY AND YEAR

The following tables summarize the information which was drawn from the Chart of Major Changes and presented in this analysis.

Number of Respondents Reporting and Number  
of Major Changes Per Year - All Categories  
(Total Respondents = 19)

	80/81	81/82	82/83	83/84	84/85
RESPONDENTS	16	11	11	8	9
CHANGES	33	30	24	15	22

Both the number of departments reporting major changes and the number of changes reported are generally about half of that recorded for the previous year.

Number of Respondents Reporting and Number  
of Major Changes Per Category - All Years  
(Total Respondents = 19)

	VOICE	RECORD	DATA	OTHER DATA	IMAGE	VIDEO
RESPONDENTS	10	6	11	4	8	1
CHANGES	34	20	31	11	21	6

Changes reported are distributed more or less as in the previous year, although the number of changes reported for "other data", "image" and "video" did not fall as much as those reported for other categories.



## 9. Major Undertakings

### Department of Communications

The Department of Communications is approaching the planning and management of its own telecommunications systems with an awareness of the need to provide visible leadership to other departments. A number of organizational and operational initiatives have been launched in 1980, and it is intended that the results be made available to the government as a whole as they materialize.

A review of telecommunications management has been conducted for the Department by GTA Consulting. The conclusions and recommendations of this study are preliminary at the time of writing, but are expected to be finalized in the fall.

The Department is experimenting with new communications systems. A pilot word processor network has been established between regional offices and headquarters centres and will be tested in two phases between September 1980 and June 1981 to identify user needs and develop procedures for evaluating performance. In the longer term currently incompatible machines may be tested.

At the same time the Department's outdated computer communications capability is scheduled for complete overhaul. Amongst the components to be updated is the computer conferencing network, over which some 35 people regularly exchange textual messages. It is hoped to include suitable new technologies which may be proposed by research and development sectors of the Department in this redevelopment project.

The Department has established a panel of experts, incorporating DOC expertise in various facets of telecommunications to undertake the long range planning and development of government telecommunications applications and infrastructures to meet its stated objectives. (Section 3). The general methodology entails a multi-phase process including:

PHASE I - Survey of telecommunications applications in the Government

The process consists of a factor analysis of generic telecommunication applications (trends and impacts) and will involve a review of subject matters and user requirements for telecommunication applications to satisfy perceived government needs. The subject matters will include areas such as electronic messaging, office communications/automation, teleconferencing, Telidon, open system interconnection and space technology applications, etc. Environmental factors such as technology, policy, socio-economic and human factors will be considered.

DOC is scheduled to report on the following early in FY 81/82, for consultation with departments:

- i) Plans for the evolution of GTA's shared services, including plans for the introduction of Digital Multiplexing System (DMS) and the DMS extended centrex (shared local services)
- ii) Feasibility and plans for the introduction of new telecommunications technology in the government. Subjects to be covered will include:
  - Telidon
  - Office Communication System
  - Open System Interconnection
  - Satellite technology.
- iii) Assessment of introduction of telecommunications applications in the government such as, electronic messaging networks with recommendations and proposals on development of these applications in the government.

PHASE II - Evaluation of the level of demand of telecommunications applications and user requirements in the government

This will involve consultation with government departments and the telecommunication carriers and industries.

PHASE III - Determination of the requirements for Government Telecommunication Infrastructures

This activity entails the evaluation of existing and planned systems, networks and services to develop plans for the development of government telecommunications infrastructures required to meet the identified needs. A primary consideration is the economies of the government-wide shared and customized systems and services and the unique departmental requirements for departmental services. The activity will also entail review of the methodology, and the framework of policies, in support of planning, monitoring and co-ordination functions.



## National Library

The National Library of Canada is planning the development of a Canadian library network to facilitate use of the nation's library resources. This network is conceived as fundamental to the future of the National Library and should be developed as part of an eventual integrated national information service. It would be designed, developed and operated on a cooperative basis with libraries and other interested parties across the country, and should eventually interface to similar networks outside Canada.

The basic functions of the network will be resource sharing and rationalization, referral and advisory services, information retrieval, bibliographic activities and shared cataloguing. The network is to be as decentralized as possible, operating at three levels, namely: 1) national/ central services and international interface; 2) regional/provincial/type of library/consortia groups; and 3) individual institutions. A distinct set of functions should be performed at each level of this hierarchy. For example, overall network planning and liaison, standards development and promotion and co-ordination of international interfaces are allocated to the national level; shared cataloguing, information retrieval, document delivery, management information and research and development to the regional/provincial level; and in-house administration, direct services to users and updating of bibliographic information to the individual institution level.

Many of the components of the network already exist, though not all in an immediately usable form. It is intended to build the network on the foundation of these components - collections, systems and specialist expertise. A major component now in place is the DOBIS (Dortmunder Bibliothekssystem) on-line data base management system, acquired in 1976 from the University of Dortmund, West Germany and modified to meet the requirements of the Canadian library community. The DOBIS system, which became operational in 1979, will continue to be enhanced and developed in a modular fashion and will eventually support all essential library functions. Current users are the National Library, CISTI (Canada Institute for Scientific and Technological Information), the Library of Parliament, the Finance/Treasury Board Library, the Libraries of the Public Service Commission and the Atomic Energy Control Board, and the Transport Canada Library and Information Centre. More libraries are planning to begin using DOBIS in 1981.

Given the importance of interfacing with other institutions and with similar networks outside Canada, the network development is being planned within the context of the Open Systems Interconnection (OSI) architecture, and serious attention is being paid to standards development.

The Library will be publishing a series of occasional papers called Canadian Network Papers on issues relating to the development of the network, the first of which deals with open systems and bibliographic communications standards. Further information on five-year plans for the development of the network is contained in these occasional papers and in The Future of the National Library of Canada (see Reading Guide). The library network development project should be of interest to planners throughout the federal government because it demonstrates the kind of approach required to establish truly integrated advanced communications systems, and because it represents an important step towards access to information maintained in libraries of the federal government and the nation.

## 10. Forecasts of Expenditures and Personnel

Telecommunications expenditures and personnel for 1979/80 are analyzed in Appendix A and reveal a growth rate for the year of 2% compared to a historic growth of 15-20%. This change in the traditional growth pattern was partially foreseen in the previous year's forecast and has been accentuated by factors such as:

- Absence of significant rate changes in 1979/80
- Government restraint programs
- Reduction in the size of the public service
- Introduction of a new authorization call code system
- Improved management of resources
- Issuing of guidelines and directives.

Since a number of these factors are unique to the year under review, the 2% growth rate is considered an anomaly and unlikely to have a significant impact on growth rates in future years. Departments forecast a continuing increase in expenditures due to expanding demands for services, but the unit cost of services will continue to drop with technological advances and fully digitized networks in particular. Current studies predict annual savings of 15% on new capital outlays and further annual savings of approximately 15% on recurring expenses.

### 10.1 Forecasts

This section contains a five-year forecast of telecommunications expenditures to assist departments in projecting overall telecommunications costs. With the exception of the cost of salaries, the forecast is produced by applying exponential regression techniques to historical data. Readers should bear in mind the shortcomings of predictions based on historical data and note that an attempt is being made by DOC to develop a more appropriate forecasting methodology. Considerably more effort in this area is also required of departmental planners. Information will be made available by DOC as it becomes available. This information would normally apply to a specific application or service.

As of the fall of 1981 the Government Telecommunications Agency expects to be able to provide departments with an annual forecast of total user charges associated with their GTA services. Information on this matter is included in the Cost Allocation Policy, Principles and Methods paper to be appended by Treasury Board to Chapter 430 of the Administrative Policy Manual.

### 10.2 Forecasts Based on Current Levels of Resource Expenditure

#### Telecommunications Expenditures Forecasts

From an analysis of historical trends, total telecommunications expenditures are estimated to increase to \$488 million by 1984/85. In the same period total telecommunications expenditures plus salaries for telecommunications personnel will reach \$647 million. Table 1 presents the five-year forecast and graph 1 illustrates the forecast trend.

### Government Telecommunications Agency Expenditures

Based on the program forecast, Government Telecommunications Agency expenditures are estimated to increase to \$94 million by 1984/85. The following is a five-year forecast and graph 2 illustrates the forecast trend.

<u>YEAR</u>	<u>PROGRAM FORECAST (\$000)</u>
80/81	64,359
81/82	72,841
82/83	78,649
83/84	85,159
84/85	94,139

### Telecommunications Personnel

Three hundred and seventy-two additional person-years in telecommunications have been reported by departments this year, for a total of 6,106. These are considered the result of more accurate reporting rather than growth. No personnel growth is forecast because of the restraints on employment, but increased emphasis on telecommunications management will result in a growth of management and administrative support personnel. The number of operating personnel should start to decrease in the early 1980's as office automation takes hold. These trends are reflected in Table 1.

### Salaries of Telecommunications Personnel

In line with current restrictions on salary increases in the federal government, the five-year forecast is based on an annual increase of 8%. This results in total salaries of \$159 million in 1984/85. Table 1 shows the detailed forecast.

### Summary

Table 2 summarizes forecast telecommunications expenditures. Total operating expenditures, total telecommunications expenditures (operating plus capital) and total telecommunications expenditures plus salaries are listed.

TABLE 1  
TELECOMMUNICATIONS EXPENDITURES FORECAST

YEAR	TOTAL TELECOM EXPENDITURES (\$000)	TELECOM PERSON-YEARS	AVERAGE ANNUAL SALARY	TOTAL TELECOM SALARY (\$000)	TELECOM EXP & SALARY (\$000)
76/77	179,935	4,511	13,650	61,575	241,510
77/78	205,506	5,206	13,357	69,541	275,047
78/79	248,995	5,732	16,406	94,022	343,017
79/80	241,429	6,106	17,706	108,114	349,543
80/81	* 293,079	** 6,106	*** 19,123	116,763	409,842
81/82	* 332,905	** 6,106	*** 20,652	126,104	459,009
82/83	* 378,141	** 6,106	*** 22,305	136,192	514,333
83/84	* 429,525	** 6,106	*** 24,089	147,087	576,612
84/85	* 487,891	** 6,106	*** 26,016	158,854	646,745

\* Projected telecommunications expenditures

\*\* Growth of telecommunications person-years

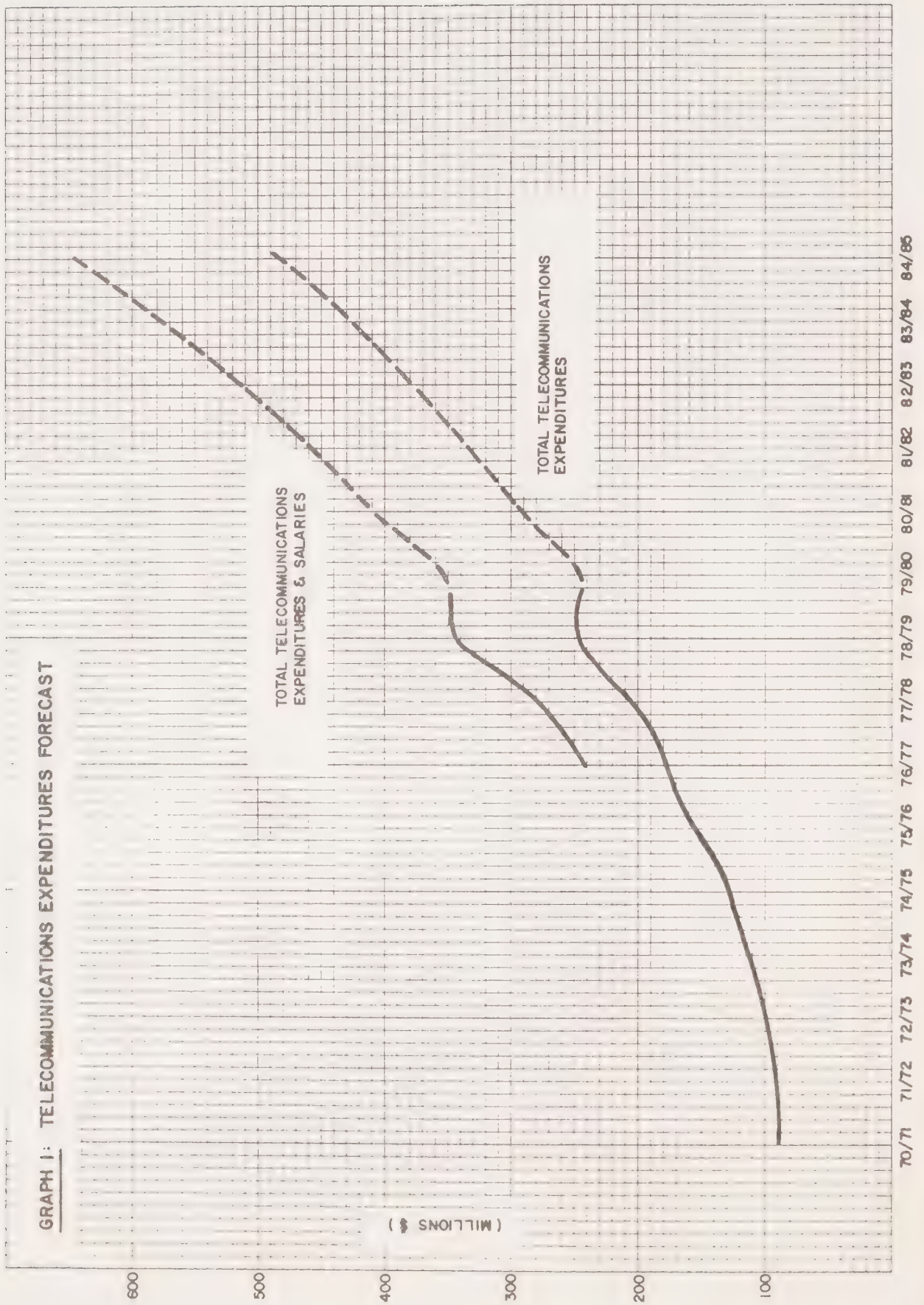
\*\*\* Projected at 8% per year

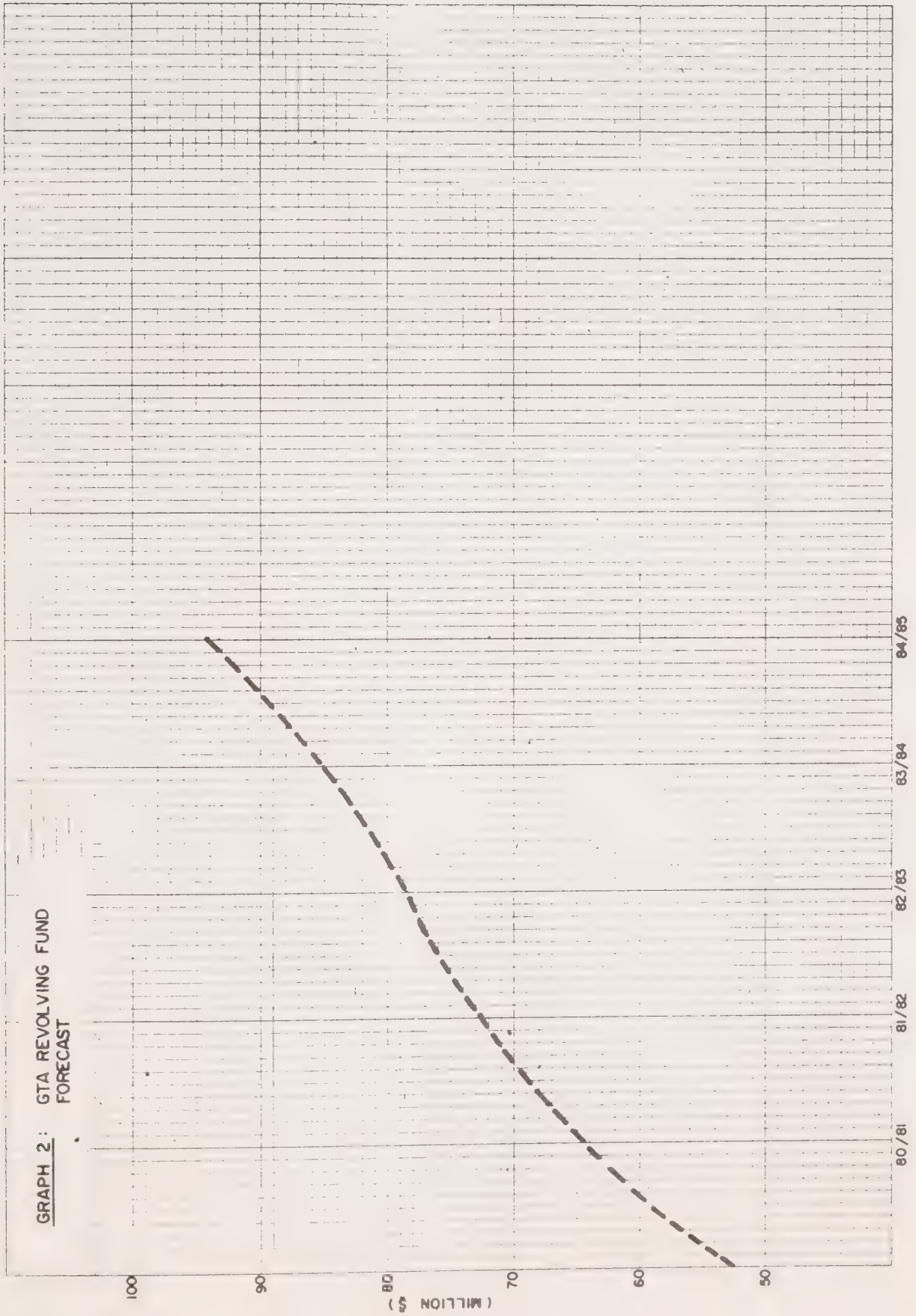


TABLE 2

## SUMMARY OF FORECAST FOR TOTAL TELECOMMUNICATIONS EXPENDITURES

YEAR	TELECOMMUNICATIONS EXPENDITURES (0220, 0221, 0222, 0621, 0655, 05) (\$000) (OPERATING)	TELECOMMUNICATIONS EXPENDITURES (0220, 0221, 0222, 0621, 0655, 0780, 0906, 04, 05) (\$000) (OPERATING & CAPITAL)	TOTAL TELECOMMUNICATIONS EXPENDITURES (0220, 0221, 0222, 0621, 0655, 0780, 0906, 04, 05 & related 01) (\$000) (OPERATING & CAPITAL & SAL.)
80/81	223,007	293,079	409,842
81/82	252,159	332,905	459,009
82/83	285,033	378,141	514,333
83/84	322,193	429,525	576,612
84/85	364,197	487,891	646,745





## 11. Conclusion

It is generally accepted that the capacity of emerging communications technologies and services far outstrips our capacity to employ and control them to good effect. In order to absorb what is happening and guide development, management must have a frame of reference. This frame of reference must be shared by management throughout the federal government, if truly integrated office communications systems are to be put in place. Otherwise segments of a potential office network will be developed without provision for logical integration into a complete system.

A close analogy could be drawn to the building of short sections of a railway line in different parts of the country as it seemed appropriate at the moment, only to find later that each section had been built to a different gauge, making it impossible to connect the lines coast to coast without rebuilding each section and scrapping most of the rolling stock and equipment.

The target system must make sense to management and inspire cooperative action. The Conceptual Definition supporting this document is intended to provide this management perspective on a government office communications network and to stimulate the development of departmental plans within a shared overall framework.



## 12. Cost/Benefit Considerations

In order to secure funds to experiment with the new technology, user management and financial officers must be convinced of the potential for early returns considerably larger than the cost of acquiring and maintaining the new systems. These returns consist both of savings through cost displacement and of the value of the extra output made possible by automation. At this point, most automated office systems are justified on the basis of potential savings alone, because there is little practical experience on which to base calculations of value added.

The cost displacement approach involves calculating the hard savings which should result from replacing human labour by machines. The theme is organizational efficiency through the automation of routine. Application of this approach is limited to routine tasks such as typing, of which costs and output are easily measured. It does not account for the vast opportunities inherent in providing automated support for management and professional work. Furthermore, it can be applied without considering side effects. For example, many organizations centralized typing in word processing pools to save secretarial costs, only to find that professionals then spend much of their more valuable time on proofreading.

Techniques for defining the value added by office automation systems are being developed on the basis of experimentation. These techniques address organizational effectiveness. Thomas Lodahl of the Diebold Group described an experience with cost benefit analysis which included both cost displacement and value added approaches in a paper presented to the March 1980 Office Automation Conference in Atlanta, Georgia (see Reading Guide). Lodahl attempted to identify value added in terms of "what new things (it allows) a person to do or how much more work, or what (it adds) to the person's capacity or worth to the organization". Calculations of value added were all expressed in terms of the cost of professional time, since estimates of the cost of professionals were considered next best to estimates of their worth to the organization.

This comprehensive approach yields very different results than that of simple cost displacement. For example, it is often found that support staff should be increased when major cost displacements in managerial time are achieved. The largest value-added benefit is found to be the value of new work: typically the output of professionals supported by text processing increases 50%-100% in the first year. Furthermore, content analysis of the work produced strongly suggests that a responsive text capturing system enables a higher percentage of creative work to be done. The value of this new work translates into a minimum of \$6,000 per professional per year. When these figures are added to time savings valued consistently at about \$10,000 per professional per year, the total savings experienced are so large in comparison to equipment costs as to be non credible. The only consideration may soon be "Can we afford to be without it?". Thus Lodahl suggests that it will probably never be necessary to document the subtle value added by the three other applications of office automation which have been identified by Richard Harkness, namely "individual augmentation", "group augmentation" and "process enablement". These findings are an indication of what can be achieved through experimentation. Departments may wish to experiment with this approach when defining costs.

### 13. Implementation Considerations

With a common frame of reference for office automation provided by the Conceptual Definition, a master plan must now be developed. This plan will define the components of the system to be tested, the order in which they should be tested and implemented, and the resources required to proceed. To return to a railway analogy, we must agree on a standard gauge of track and the most desirable route for the coast to coast line in advance, then build sections where they are most needed first, but in accordance with the over-all agreement.

If such a master plan is to be developed and implemented, departments will have to collaborate. Signs of a very limited and tentative pooling of effort are beginning to appear, but a formal channel which would elevate the profile of the work and stimulate interest in participating is entirely lacking. Such a forum is provided in the United States by the federal government Office Automation Council and its associated Industry Committee. With such a structure in place it would be possible to provide a progressively more concrete planning framework in each edition of the Annual Review.

If coordinated testing of new communications systems were to begin in 1980/81, the fifth edition of the Annual Review could report on the conceptual design of the network (i.e. the mandatory features of the network, expressed in more detail than in the Conceptual Definition) and provide preliminary functional specifications (what the system should do for the user) as well as preliminary implementation guidelines. The 1982 edition could contain expanded functional specifications and implementation guidelines plus a framework for budgetary control, all based on an expanded cooperative test program. By 1983 complete functional specifications and a detailed framework for budgetary control could be presented along with a progress report on implementation.

None of the above will happen unless a policy framework which fosters cooperation and experimentation is established, nor unless senior management throughout the government supports efforts to plan and test integrated information management systems. As pointed out in Section 4.4, policy could be developed on the basis of experience and in concert with the planning and budgetary frameworks as long as basic enabling policies are put in place at the government-wide and departmental levels. It is hoped that subsequent editions of the Annual Review will be able to report progress in this area also.

RECOMMENDATIONS1. On Planning and Management

- 1.1 The Department of Communications should take the lead in fostering cooperation among departments in the planning, development and implementation of innovative government telecommunications applications and systems, with priority on office communications systems and the use of satellites.
- 1.2 In conjunction with the initiatives of Treasury Board Canada to establish a comprehensive policy and development strategy for the use of information technology, departments should evaluate their internal policies, procedures and organizational structures to facilitate the integration of telecommunications, data processing and office administrative functions permitting the efficient and effective management of information. The Department of Communications should proceed to establish recommendations for a policy framework aimed at the efficient and effective use of telecommunications as the binding agent in the management of information.
- 1.3 Departments should establish the position of Telecommunications Coordinator in accordance with the Occupational Profile for Telecommunications Coordinators.
- 1.4 The Department of Communications should extend its seminars for departmental telecommunications staffs to include those responsible for departmental planning.
- 1.5 The Department of Communications should evaluate the impact of liberalized terminal attachment regulations on government telecommunications administration and provide guidance to departments and make recommendations to Treasury Board Canada on this matter.
- 1.6 To facilitate the orderly development of federal telecommunications standards, the mandate of existing government standards bodies should be reviewed. The Department of Communications should consult with departments and make recommendations to Treasury Board Canada on this matter.

2. On Shared Services

- 2.1 The Government Telecommunications Agency should provide departments with information to facilitate the development of their main estimates with respect to telecommunications.
- 2.2 In reviewing their use of existing telecommunications and in planning and developing new applications of information technology for their operations and for program delivery, departments should consider using existing and planned government shared networks to ensure economies of scale and compatibility of communications within the government.
- 2.3 Departments should consult GTA concerning the use of shared intercity facilities during off-peak hours to optimize the use of these facilities and to achieve savings. Departments should also examine, in conjunction with GTA, how facsimile and communicating word processing equipment can be used to best effect on the local and intercity shared government networks.

3. On Customized and Departmental Services

- 3.1 Departments should take steps to evaluate the effectiveness and economy of media switch in their particular applications. For example, the use of innovative office communications systems such as communicating word processors, multifunctional terminals and electronic messaging systems to replace paper, voice and face-to-face meetings should be examined.
- 3.2 At the same time, departments with representative requirements and/or special expertise should join with the Department of Communications in the cooperative testing, evaluating and development of innovative office communications systems. The results of this collaboration should be made available to other departments.
- 3.3 Departments should assess their current use of facsimile in light of recent developments in technology, including the consideration of other cost effective alternatives.
- 3.4 Departments should consult the Department of Communications as early as possible when considering attachment of customer provided equipment to common carrier and GTA networks.



#### 4. Progress on Previous Recommendations

Since a means has yet to be established for monitoring departmental response to the recommendations of the Annual Review, the initiatives reported below refer mainly to the recommendations directed to the Department of Communications.

##### On Shared Services

1. DOC should undertake studies to identify potential savings through the use of shared networks for computer communications, facsimile and word processing; and
2. DOC should initiate studies to determine the likely impact of office automation on government telecommunications. Requirements and plans should be developed for the introduction of telecommunications services to meet the future office systems needs of government departments. Departments should consult DOC when planning office communications.

DOC has provided in this edition of the Review the conceptual definition of an automated office communications network for the federal government. The definition is intended to stimulate departmental planning within an overall framework.

DOC has initiated a program to evaluate varying forms of electronic messaging networks. A pilot trial of a communicating word processor network is underway within the Department of Communications. The Department of Communications has established a process to identify long term plans and strategies for the development of telecommunications applications and networks in the government.

3. Departments should consider using the GTA teleconferencing facility to improve efficiency and cut down business travel.

The teleconferencing system provided by GTA has been improved and bookings have increased by 50% over the past year. A circular (No. T.B. 1980-21) prepared by GTA has been promulgated by Treasury Board to inform departments about the shared teleconferencing service, outline procedures for establishing and maintaining customized systems and explain how teleconferencing can be used as a management tool. In addition, GTA has issued a circular outlining administrative procedures for the use of the shared service.

### On Customized and Departmental Services

1. DOC should establish a standard for word processors used by the federal government, and departments should take steps to ensure that all new purchases of word processing equipment meet this standard.

The Department of Communications has sponsored a university research contract to evaluate the communication capabilities and compatibility requirements of selected word processors. A report on the outcome of this study is available from DOC/GTA. Discussion continues between the Department of Communications, the Government EDP Standards Committee Secretariat and industry on federal standards for interfacing communicating word processors.

### On the Planning and Management Process

1. DOC should provide more extensive guidance to departments on the development and reporting of long range telecommunications plans.
  - In consultation with the Telecommunications Advisory Committee, DOC developed a telecommunications planning process which was endorsed by the TAC in January 1980. The objective was to improve the management of telecommunications by clarifying the roles of departments, DOC and Treasury Board and explaining the potential results of improved management.
  - A revised financial coding structure has been proposed to Treasury Board.
  - The instructions for departmental annual telecommunications reports were revised in 1979/80 and will be further revised in 1980/81 to provide more explicit guidance to departments.
  - DOC held seminars in February 1980 to explain reporting requirements to all Telecommunications Coordinators and the staff of GTA Regional Offices.
2. DOC should take the lead in developing standards and specifications for government office communications systems to reduce equipment incompatibilities and support the Canadian electronics industry where economics warrant.

The conceptual definition included in this Review is an initial step in the development of such standards and specifications through practical tests.

3. Departments should identify or establish capabilities for planning and implementation of administrative as well as operational telecommunications systems, drawing on the expertise of data and word processing as well as telecommunications professionals.

Departmental annual telecommunications reports and response to the work of the Information Technology Task Force indicate that some departments have established integrated information management capability of this kind or are preparing to do so.

4. Departments should design and initiate career development and training programs to unite the various disciplines of information management and prepare personnel at all levels for the fundamental changes in organizational structures and job content which are already resulting from new forms of information technology. The EIC job profiles should be considered in personnel planning.

In conjunction with the Public Service Commission, DOC has established an Occupational Profile for departmental Telecommunications Coordinators and validated it with departments. On this basis a survey of training needs has been conducted by an ad hoc committee under DOC chairmanship. The results of this survey have been compiled and presented to TAC and are to be tabled at a meeting of the Interdepartmental Committee on Telecommunications Personnel due to be established at the end of 1980.

5. An inventory should be taken of the policies affecting government telecommunications planning.

The Task Force on Information Technology established by Treasury Board in February 1980 addressed this requirement. A complete inventory has yet to be established.





## APPENDICES



## APPENDIX A

### Telecommunications Expenditures and Personnel

#### 1. Introduction

This section reports federal government expenditures for telecommunications and related personnel resources by economic object. The information was obtained from annual telecommunications reports submitted by a total of 52 departments at Treasury Board Canada request this year. As prescribed in the Guide on Telecommunications Administration, these were departments and agencies named in Schedules A and B of the Financial Administration Act, and branches designated as departments for the purpose of that Act whose telecommunications expenditures exceed \$20,000 per year. Urban Affairs and the Anti-Inflation Board were deleted from the list and Parks Canada was accounted for by the Department of the Environment rather than Indian & Northern Affairs this year.

The total amount of expenditure on telecommunications in the Government of Canada in 1979/80 is available from the Public Accounts. Returns from the reporting departments covered over 98.5% of this amount and provided a breakdown by standard and economic object, as follows:

01	Salaries and wages of telecommunications personnel
0220	Telephone
0221	Telegraph, cable and wireless
0222	Other communication services
04	Professional and special services
	- telecommunications
05	Rentals - telecommunications equipment
0621	Repair - telegraph and telephone lines
0655	Repair - communication and related equipment
0780	Parts - communication and related equipment
0906	Acquisition - communication and related equipment

As in previous years, expenditures reported in each of these categories were extrapolated to account for 100% of federal expenditures. Identification of telecommunications expenditures is still impeded by a vague definition of administrative telecommunications and the inadequacies of financial coding procedures. Initiatives in these areas and in that of GTA cost allocation are reviewed briefly here.

Coding of Telecommunications Expenditures - The current classification system for the coding of telecommunications expenditures is wholly inadequate to provide an understanding of spending patterns. Some departments have developed detailed classifications within this system to satisfy internal requirements, but others have lacked the expertise to do so. Furthermore, the need remains for an appropriate standard system to permit a more detailed profile of the government's aggregate expenditures to be established.

A Working Group on Telecommunications Expenditure Coding was established by the Telecommunications Advisory Committee (TAC) in late 1979 to develop a new classification system. A proposal was submitted to and endorsed by the TAC in July 1980 and passed to Treasury Board Canada for review by the Office of the Comptroller General. It is anticipated that the proposal will

be approved by Treasury Board Canada in 1980 and promulgated in 1981 for implementation in 1982. When implemented it is expected that information now collected from departments on forms 1 and 2 of the annual telecommunications report will be available automatically.

The proposed system covers all forms of conventional telecommunications. It is envisaged as a make-ready for the development of a more comprehensive system suitable for the emerging environment of integrated information management and all-digital communications.

Definition of Telecommunications - Reporting of telecommunications expenditures and personnel has been further complicated by the absence of an adequate definition of telecommunications for administrative purposes. This is a universal problem, exacerbated by the merging of telecommunications, data processing and office equipment technologies and management.

The definition to which departments are now referred is contained in the Guide on Telecommunications Administration. This definition is to be revised by the TAC Working Group on Telecommunications Expenditure Coding in the second phase of its work. So far the Group has developed a glossary of terms in conjunction with its coding proposal. These may become the basis for the new definition.

GTA Cost Allocation - After extensive study during 1979/80 GTA presented a proposal to revise its Cost Allocation Policy and Practices to the TAC in July. The proposal was approved and is to be issued by Treasury Board Canada as an appendix to the revised Chapter 430 (Telecommunications) of the Administrative Policy Manual in 1981.

The principal objective of the revision is to provide for a more visible and equitable allocation of GTA expenditures to client departments. However, as reported in the third Annual Review, provision is also being made for departments to receive a user forecast (anticipated monthly traffic volume per department) and a service forecast (GTA rates) each year at the beginning of September, starting in 1981.

## 2. Financial Status

For the first year since information has been gathered (1976/77) there was no growth in telecommunications expenditures. In fact, a real decline was recorded, since the overall growth at 2% was well below that of inflation. Traditionally, telecommunications expenditures have been increasing at the approximate rate of 15-20% per year, although the previous Annual Review forecast a 7% growth rate for 1979/80.

### 2.1 Breakdown of Total Telecommunications Expenditures

Total telecommunications expenditures in 1979/80 were approximately \$350 million - \$7 million or 2% higher than in the previous year. A 15% increase in personnel costs was offset by a comparable decrease in capital costs. Expenditures are broken into operating, capital and telecommunications personnel costs and compared to previous years in Table 1.



## 2.2 Historical Data

A breakdown of telecommunications expenditures by object for the period 1970 through 1980 is presented in Table 2, and a percentage distribution for the same period in Table 3.

## 2.3 Shared, Customized and Departmental Services

Analysis of the 1979/80 annual reports has provided an appreciation of (02) operating expenditures on shared, customized and departmental services for voice and data communications. The distribution of expenditures compared to 1977/78 and 1978/79 is as follows:

	<u>Shared</u>	<u>Customized</u>	<u>Departmental</u>
<u>Voice</u>			
1977/78	\$44,890,000 (50%)	\$6,284,600 (7%)	\$38,605,400 (43%)
1978/79	\$46,765,000 (42.6%)	\$4,189,000 (3.8%)	\$58,695,000 (53.6%)
1979/80	\$43,142,000 (38.3%)	\$3,830,000 (3.4%)	\$65,670,000 (58.3%)
<u>Data</u>			
1977/78	\$ 3,360,600 (6%)	\$2,240,440 (4%)	\$50,409,000 (90%)
1978/79	\$ 2,151,000 (3.3%)	\$1,629,000 (2.5%)	\$61,392,000 (94.2%)
1979/80	\$ 2,787,000 (4.4%)	\$2,471,000 (3.9%)	\$58,094,000 (91.7%)

## 2.4 Operating Telecommunications Expenditures

Table 4 gives a detailed comparative breakdown of (02) operating telecommunications expenditures for 1978/79 and 1979/80. (05) and (06) expenditures are not included. Operating expenditures have increased by less than 1% over the past year, while the amount recovered by the Government Telecommunications Agency has increased by 1%.

## 2.5 Total Reported Telecommunications Expenditures

Table 5 gives a comparative breakdown of total reported telecommunications expenditures (including salaries) ranked by department for 1977/78, 1978/79 and 1979/80. Total reported telecommunications expenditures increased by 2% over the past year when these figures are extrapolated to reflect those of the federal government as a whole.

## 3. Personnel

Information reported this year is more or less consistent with that of the previous year. No major new categories of personnel were reported. The breakdown by category has remained stable and growth has fallen from 10% to 6%. It is thus concluded that reports are now reliable.

A breakdown of personnel by category is shown in Table 6. Numbers of person-years grew 6% to 6,106 while salary increases average 8% rather than the forecast 7%. The most significant change is an increase in contracted and consulting personnel.

Graph 1 shows the percentage of public service telecommunications personnel employed in five functional areas. This percentage distribution is consistent with that of the previous year.

#### 4. Observations

##### 4.1 Departmental Annual Telecommunications Reports

The Guide on Telecommunications Administration applies to all departments and agencies named in Schedules A and B of the Financial Administration Act and to all branches designated as departments for the purpose of that Act. It was agreed by Treasury Board Canada in 1977 that only those departments whose telecommunications expenditures were over \$20,000 would be asked to submit annual reports. The following have subsequently become eligible to contribute:

<u>Organization</u>	<u>Approximate Annual Telecommunications Expenditures</u>
Northern Pipeline Agency	\$134,000
Commission for Federal Judicial Affairs	\$122,000
Canada Labour Relations Board	\$ 83,000
Economic Development	\$ 70,000
Canadian Human Rights Commission	\$ 67,000
Supreme Court of Canada	\$ 37,000
Status of Women	\$ 30,000

However, the present 52 reporting departments account for 98.5% of total government expenditures for telecommunications. Including the above seven organizations would increase the percentage only to 98.7%. In fact, raising the cut-off level to \$100,000 reduces the number of reporting departments to 44 but only reduces the total telecommunications expenditures reported by 0.5%. It may thus be advisable to remove the burden of reporting from smaller departments, while encouraging them to remain familiar with developments through the Annual Review. A decision on this matter should be made by Treasury Board Canada before the next reporting cycle.

##### 4.2 Expenditures

Two major departments contributed significantly to the decreased growth in expenditures in 1979/80. Employment and Immigration reported rental (05) expenditures of approximately \$2 million less than the previous year because an EDP expenditure of this amount was mistakenly reported as telecommunications in 1978/79. The Department of National Defence reported decreases of \$2 million on telephones (02), \$3 million on parts (07), and \$5 million on acquisitions (09).

Other factors accounting for the real decline in expenditure this year were:

- Absence of significant rate increases in 1979/80
- Reduction in the size of the public service
- Government restraint programs
- Improved management of telecommunications resources
- Introduction of a new authorization call code system.

While federal government telecommunications expenditures have declined in real terms during 1979/80, the telecommunications carrier industry (telephone companies, CN/CP, Teleglobe and Telesat) estimated its 1979 revenue at \$5.5 billion, or 15% increase over the previous year.

#### 4.3 Personnel

The ratio between public service staff and management personnel in telecommunications is 9:1. Contract and consultant personnel, reported in noticeable numbers for the first time this year, are concentrated in management but do not change the ratio significantly. Most staff are employed as operators of communications equipment. An attempt is being made to develop a basis for comparing the cost and disposition of telecommunications and EDP personnel, since total expenditures in these two areas are more or less comparable and since both relate to the management of information.

Awareness of the critical need to improve the calibre of telecommunications personnel is growing. Action has been taken on recommendations of the 1979 report of the TAC Working Group on Telecommunications Personnel which are considered prerequisites for further progress. An ad hoc committee was established to survey departmental training requirements. In conjunction with the Public Service Commission and five Telecommunications Coordinators, this committee developed an Occupational Profile for Telecommunications Coordinators which will be recommended as a government standard.

With the profile in place it should be possible to follow through on the remaining recommendations of the Working Group. Of general concern is the recommendation that an occupational group be established for telecommunications staffs. The formal skill requirements definition and career path which this would provide are considered essential by a number of departments if talented people are to be attracted and retained. This step is not inconsistent with the view that all those providing information management services should be regarded as working in the same sector. In fact, it should provide a basis for more serious collaboration between telecommunications, data processing and administrative professionals than has been experienced to date.

The profile has been used as the point of reference for defining training needs in a DOC/PSC survey of departments of various sizes. The findings of the survey were reported to TAC by DOC in September along with recommendations and an action plan. Meanwhile, departments interested in telecommunications training should consider using the professionally produced audio-visual training modules available through the PSC Informatics Learning Centre. Those dealing with office automation are particularly useful, since almost everyone is a novice in this area.

TABLE 1

## TELECOMMUNICATIONS EXPENDITURES BY CATEGORY

COSTS	OBJECT OF EXPENDITURE	1977/78 (\$000)	1978/79 (\$000)	1979/80 (\$000)	% CHANGE OVER 78/79
OPERATING	(0220) Telephone	93,006	111,583	112,735	
	(0221) Telegraph, Cable & Wireless	43,743	47,045	48,323	
	(0222) Other Telecommunications Services	9,042	16,193	15,031	
	(0621) Repair - Telegraph & Telephone Lines	45	32	10	
	(0655) Repair - Communication & Related Equipment	3,449	4,264	4,486	
	(05) Rentals - Telecommunications Equipment	7,780	12,163	11,035	
	TOTAL	157,065	191,280	191,620	0.2%
CAPITAL	(0780) Parts - Communication & Related Equipment	15,458	17,109	15,781	
	(0906) Acquisition - Communication & Related Equipment	32,129	39,960	33,372	
	TOTAL	47,587	57,069	49,153	-14%
TELECOMMU- NICATIONS PERSONNEL	(04) Professional & Special Services - Telecommunications	854	646	656	
	Salaries and Contracted Personnel	69,541	94,022	108,114	
	TOTAL	70,395	94,668	108,770	15%
	TOTAL GOVERNMENT TELECOMMUNICATIONS EXPENDITURES	275,047	343,017	349,543	2%



DISTRIBUTION OF TELECOMMUNICATIONS EXPENDITURES (excluding salaries)

	1970-71 (\$000)	1971-72 (\$000)	1972-73 (\$000)	1973-74 (\$000)	1974-75 (\$000)	1975-76 (\$000)	1976-77 (\$000)	1977-78 (\$000)	1978-79 (\$000)	1979-80 (\$000)
TELEPHONE (0220)	25,463	30,856	37,071	42,993	52,860	65,565	75,617	93,006	111,583	112,735
TELEGRAPH, CABLE & WIRELESS (0221)	40,035	37,334	36,728	38,187	37,099	39,117	42,256	43,743	47,045	48,323
OTHER TELECOM SERVICES (0222)	892	864	1,150	3,361	4,228	5,667	6,964	9,042	16,193	15,031
REPAIR - TELEGRAPH & TELEPHONE LINES (0621)								45	32	10
REPAIR - COMMUNICATION & RELATED EQUIPMENT (0655)	1,510	1,579	1,705	1,948	2,191	2,645	3,058	3,449	4,264	4,486
PARTS - COMMUNICATION & RELATED EQUIPMENT (0780)	6,635	6,310	7,604	8,474	9,330	9,708	11,842	15,458	17,109	15,781
ACQUISITION - COMMUNICATION & RELATED EQUIPMENT (0906)	10,609	12,072	11,868	14,787	17,780	26,398	32,642	32,129	39,960	33,372
PROFESSIONAL & SPECIAL SERVICES - TELECOM (04)	356	372	401	458	515	622	719	854	646	656
RENTALS - TELECOM EQUIPMENT (05)	3,377	3,531	3,812	4,353	4,898	5,915	6,837	7,780	12,163	11,035
TOTALS	88,877	92,918	100,339	114,561	128,901	155,637	179,935	205,506	248,995	241,429

TABLE 3

DISTRIBUTION OF TELECOMMUNICATIONS EXPENDITURES BY PERCENTAGE (excluding salaries)

	1970-71	1971-72	1972-73	1973-74	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80
TELEPHONE (0220)	28.6%	33.2%	37.0%	37.5%	41.0%	42.1%	42.0%	45.3%	44.8%	46.7%
TELEGRAPH, CABLE & WIRELESS (0221)	45.0%	40.2%	36.6%	33.3%	28.8%	25.1%	23.5%	21.3%	18.9%	20.0%
OTHER TELECOM SERVICES (0222)	1.0%	0.9%	1.1%	3.0%	3.3%	3.6%	3.9%	4.4%	6.5%	6.2%
REPAIR - TELEGRAPH & TELEPHONE LINES (0621)								*	*	*
REPAIR - COMMUNICATION & RELATED EQUIPMENT (0655)	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.9%
PARTS - COMMUNICATION & RELATED EQUIPMENT (0780)	7.5%	6.8%	7.6%	7.4%	7.2%	6.2%	6.6%	7.5%	6.9%	6.5%
ACQUISITION - COMMUNICATION & RELATED EQUIPMENT (0906)	12.0%	13.0%	11.8%	12.9%	13.8%	17.1%	18.1%	15.6%	16.0%	13.8%
PROFESSIONAL & SPECIAL SERVICES - TELECOM (04)	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.3%	0.3%
RENTALS - TELECOM EQUIPMENT (05)	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	4.9%	4.6%

\* less than 0.1%

BREAKDOWN OF OPERATIONAL TELECOMMUNICATIONS  
EXPENDITURES FOR 1978/79 and 1979/80

SERVICE	TOTAL (02) OPERATIONAL TELECOMMUNICATIONS EXPENDITURES	(02) OPERATIONAL EXPENDITURES RECOVERED BY GTA	% OF TOTAL GTA COSTS RECOVERED (02) EXP.
	\$	\$	%
INTERCITY	64,847,680	42,096,543	80.7
LOCAL SERVICES	47,794,320	2,438,987	4.7
INTERCITY	47,837,725	7,634,622	14.6
LOCAL SERVICES	15,514,275	*	*
TOTALS	175,994,000	52,170,172	100.0
INTERCITY	60,658,000	40,739,895	81.94
LOCAL SERVICES	48,990,700	2,595,877	5.22
INTERCITY	49,843,500	6,382,440	12.84
LOCAL SERVICES	15,328,800	*	*
TOTALS	174,821,000	49,718,212	100.0

1979/80

1978/79

\* Cost of data local services is included with data intercity.

TABLE 5

TOTAL REPORTED TELECOMMUNICATIONS EXPENDITURES  
(INCLUDING SALARIES) RANKED BY DEPARTMENT

DEPARTMENTS/AGENCIES	1977/78 (\$000)	1978/79 (\$000)	1979/80 (\$000)
NATIONAL DEFENCE.....	111,250	138,815	130,806
SOLICITOR GENERAL RCMP.....	32,008	42,793	51,488
EMPLOYMENT AND IMMIGRATION CANADA.....	19,740	25,913	23,755
TRANSPORT CANADA.....	15,629	19,788	20,842
EXTERNAL AFFAIRS.....	15,536	19,385	18,786
ENVIRONMENT CANADA.....	13,731	10,844	14,816
NATIONAL REVENUE TAXATION.....	6,273	7,895	9,145
SUPPLY AND SERVICES.....	5,377	7,081	7,634
COMMUNICATIONS.....	5,018	7,349	7,130
NATIONAL HEALTH AND WELFARE.....	4,269	5,239	5,349
POST OFFICE.....	3,580	4,207	5,294
INDIAN AND NORTHERN AFFAIRS (PARKS CANADA WITH ENVIRONMENT).....	5,766	6,845	4,717
FISHERIES AND OCEANS.....	*	3,412	4,432
CORRECTIONAL SERVICE.....	0	4,056	4,176
AGRICULTURE CANADA.....	3,310	3,664	3,645
PUBLIC WORKS.....	3,897	3,137	3,321
INDUSTRY, TRADE AND COMMERCE.....	2,006	2,752	3,085
NATIONAL REVENUE CUSTOMS AND EXCISE.....	2,467	3,006	3,080
STATISTICS CANADA.....	0	2,203	2,240
ENERGY MINES AND RESOURCES CANADA.....	1,632	2,285	2,006
SECRETARY OF STATE.....	1,767	1,989	1,838
REGIONAL ECONOMIC EXPANSION.....	1,741	1,904	1,825
PUBLIC SERVICE COMMISSION.....	0	1,733	1,691
NATIONAL RESEARCH COUNCIL.....	973	1,136	1,276
VETERANS AFFAIRS.....	1,047	1,263	1,260
CONSUMER AND CORPORATE AFFAIRS.....	1,090	1,189	1,167
JUSTICE.....	732	806	974
CHIEF ELECTORAL OFFICER (TWO ELECTIONS IN 79/80).....	43	87	951
NATIONAL FILM BOARD.....	789	938	944
PRIVY COUNCIL.....	511	647	631
NATIONAL MUSEUMS.....	490	576	626
CANADIAN TRANSPORT COMMISSION.....	483	563	611
FINANCE.....	485	561	551
CANADIAN INTERNATIONAL DEVELOPMENT AGENCY.....	512	631	511
LABOUR.....	381	527	478
TREASURY BOARD.....	421	416	469
NATIONAL LIBRARY.....	191	441	444
NATIONAL ENERGY BOARD.....	249	339	391
CANADIAN RADIO TELEVISION AND TELECOM COMMISSION.....	331	356	319
AUDITOR GENERAL.....	216	271	303
SOLICITOR GENERAL.....	242	297	270
PUBLIC ARCHIVES.....	176	219	264
NATIONAL PAROLE BOARD.....	135	234	243
ATOMIC ENERGY CONTROL BOARD.....	76	251	119
SCIENCE AND TECHNOLOGY.....	120	127	114
ECONOMIC COUNCIL OF CANADA.....	57	106	103
CANADIAN INTERGOVERNMENTAL CONFERENCE SECRETARIAT.....	0	104	89
COMMISSIONER OF OFFICIAL LANGUAGES.....	50	80	86
PUBLIC SERVICE STAFF RELATIONS BOARD.....	79	79	82
IMMIGRATION APPEAL BOARD.....	62	77	81
SCIENCE COUNCIL OF CANADA.....	58	67	67
INSURANCE.....	43	49	51
GRAND TOTAL	**265,950	**339,411	344,576

\*Combined with Environment    \*\*Includes Urban Affairs & Anti-Inflation Board



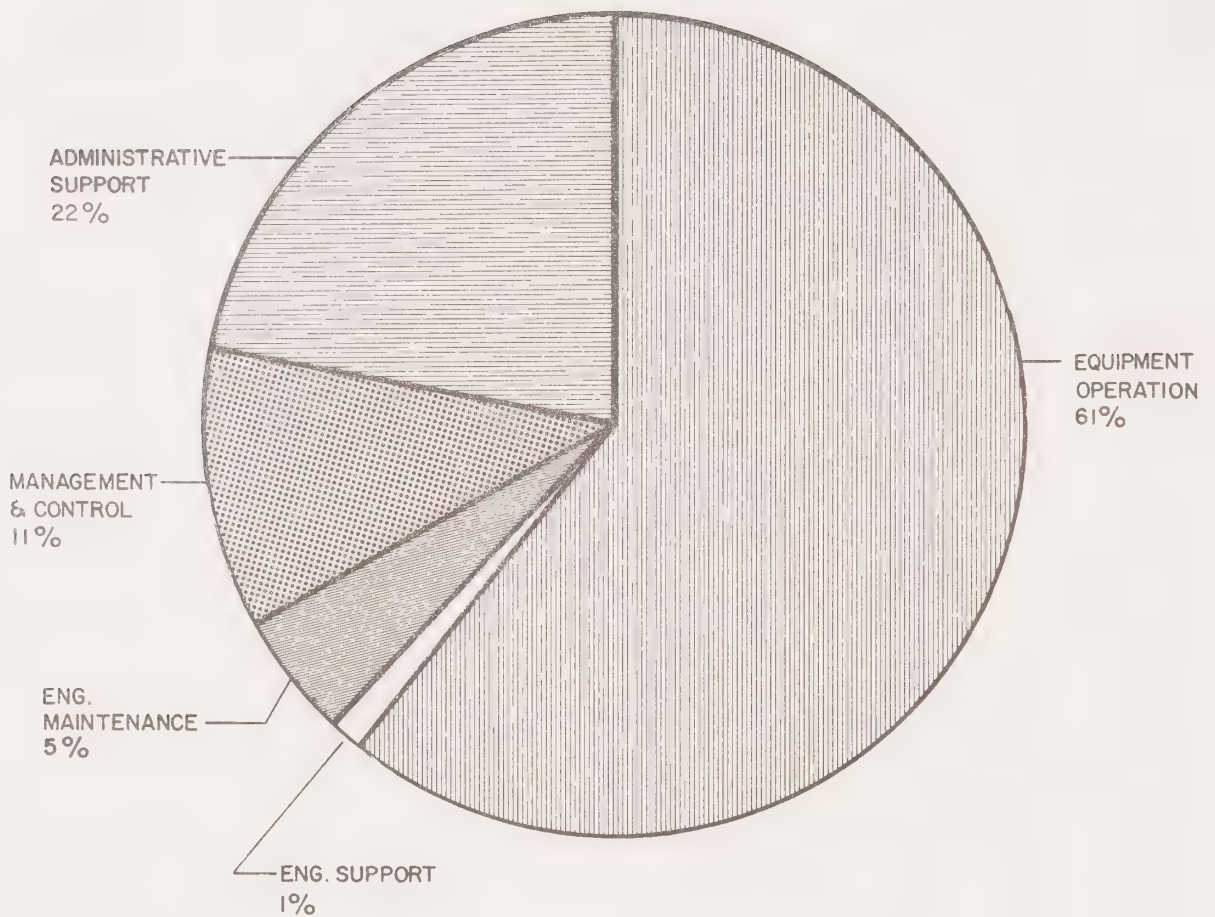
TABLE 6

## TELECOMMUNICATIONS EMPLOYEES 1979/80

<u>PSC CATEGORY</u>	<u>GROUP NAME</u>	<u>NUMBER EMPLOYED</u>
CR	CLERICAL & REGULATORY	889
CM	COMMUNICATION	717
DA	DATA CONVERSION	294
AS	ADMINISTRATIVE SERVICES	250
ME	MUNICIPAL EMPLOYEE	197
EL	ELECTRONICS	137
ST	SECRETARIAL, STENOGRAPHIC & TYPING	121
CS	COMPUTER SYSTEM ADMINISTRATION	93
-	OTHERS	82
GS	GENERAL SERVICES	17
GES/MES	MESSENGER SERVICE	17
ENG	ENGINEERING & LAND SURVEY	15
FI	FINANCIAL ADMINISTRATION	14
DD	DRAFTING & ILLUSTRATION	8
GL	GENERAL LABOUR & TRADE	5
RO	RADIO OPERATIONS	5
OM	ORGANIZATION & METHODS	5
PG	PURCHASING & SUPPLY	3
COM	COMMUNICATIONS CLERK	3
OCE	MACHINE OPERATOR	3
SCY	SECRETARY	2
OE	OFFICE EQUIPMENT	2
CO	COMMERCE	2
IS	INFORMATION SERVICES	2
SI	SOCIAL SCIENCE SUPPORT	1
EG	ENGINEERING & SCIENTIFIC SUPPORT	1
SX	SENIOR EXECUTIVE	1
GL-MAN	GENERAL LABOUR & TRADE-MANIPULATING	1
CON	DATA PROCESSING-DATA CONVERSION	1
PM	PROGRAM ADMINISTRATION	1
PSC TOTAL		2,889
UNIFORMED PERSONNEL		3,115
CONTRACTED AND CONSULTANTS		<u>102</u>
TOTAL		6,106

GRAPH 1

PERCENTAGE OF PUBLIC SERVICE TELECOMMUNICATION  
PERSONNEL EMPLOYED IN VARIOUS AREAS  
OF ACTIVITY 1979/80



## APPENDIX B

### Inventory of Operating Telecommunications Systems

#### 1. Introduction

The inventory of telecommunications systems is maintained using data provided by two sources. Information regarding the Government Telephone Network and the Government Data Network Service is supplied by DOC/GTA. Information pertaining to all other types of telecommunications systems is solicited from departments that submit Annual Telecommunications Reports to Treasury Board.

Development of the inventory has been impeded by departmental response and limitations inherent in the control procedures. Many departments have neither the staff nor records available to identify their telecommunications applications readily. Furthermore, the system employed within DOC to record and control the federal government inventory is not flexible enough to accommodate input/output requirements within reasonable time frames.

Reports on systems for 1979/80 were provided by 30 departments. This represents a 58% response in the fourth year of reporting. The 1979 report of the Auditor General on the Management of Telecommunications states that "...departments had not gathered the information on their own telecommunications needs and utilization required for proper planning and control." This is borne out by the poor response to the request for systems' details current to March 31, 1980. The Auditor General's report also refers to DOC's responsibility to "...develop objectives and an operational plan... The plan should include the means to identify and recommend to Treasury Board networks and systems used in Government where savings can be achieved through consolidation or integration." DOC will be inhibited in recommending cost effective consolidations and integrations to Treasury Board Canada until departments provide comprehensive system details.

In preparation for the receipt of better information from departments, and in accordance with a recommendation of the third Annual Review, DOC is reviewing the data collection and storage methods used to maintain the inventory of telecommunications systems. The inventory will be restructured to reflect the new financial coding structure and account for all types of telecommunications systems. The ultimate system should accommodate updates as they occur and provide fast turn-around analysis to support telecommunications planning studies. It is intended that specifications for the new system be made available to departments so that their inventories can develop along compatible lines and eventually link up to the main inventory.

Information contained in the inventory maintained by DOC covers 73% by dollar value of total government systems. This figure is derived by applying the total reported operational (02) expenditures of the 52 departments to the reported (02) expenditures of departments that reported systems. Departmental responses to March 31, 1980 cover only 47% by dollar value of total government systems on this basis.

The status of operating telecommunications systems at March 31, 1980 is presented as follows:

2. Government Telephone Network
3. Government Data Network Service (GDNS)
4. Teleprinter
5. Facsimile
6. Communicating word processors
7. Dial-access data terminals

2. Government Telephone Network

DOC/GTA manages consolidated government telephone systems in 20 cities across Canada. A consolidated system is a shared telephone service permitting participating departments/agencies to realize economic savings through shared use of a centrex or private automatic branch exchange (PABX) service and optional use of shared intercity services.

Implementation of a consolidation in Charlottetown has been delayed to 1982. Existing consolidations are being updated with electronic common control equipment. By mid 1980 new machines will be in service in Saint John, N.B., Moncton, Regina, Nanaimo and Edmonton. GTA and Bell Canada are currently studying the use of Digital Multiplex Switching in the Ottawa/Hull consolidation for planned implementation in 1983. Negotiations between GTA and Bell Canada will commence in the fall of 1980 to develop a customer serving plan to satisfy the telecommunications needs of the federal government.

The installation of automatic call detail recording systems to permit more equitable allocation of costs to users continues. Systems were implemented in Winnipeg, Fredericton and Washington during 1979/80. Systems in Hamilton, London, Montreal, Quebec, Sherbrooke, Moncton and Saint John, N.B. will be inaugurated in 1980/81.

GTA maintains a federal government shared teleconference system which allows for meetings of participants at up to ten locations across the country. Amount of use is not restricted, but bookings must be made in advance. The new system facilitates meetings between and within user departments on a more cost-effective basis than previously. Bookings have continuously increased to a current average of 40 calls per month. Treasury Board Circular 1980-21, "Telecommunications Administrative Practices for Teleconference Services" has been issued to increase departmental awareness of this service.

The following table updates that which appeared in the 1978/79 Annual Review. Note that the total number of telephone sets accessing consolidations decreased in 1979/80 for the first time since 1975/76.



TOTAL TELEPHONE SETS ACCESSING CONSOLIDATIONS					
YEAR	MAIN LOCALS	EXTENSIONS	TOTAL SETS	PBX LOCALS & EXTENSIONS	TOTAL
1975/76	68,833	44,479	113,312	NOT AVAIL.	-
1976/77	72,921	48,908	121,829	NOT AVAIL.	-
1977/78	78,289	57,384	135,673	NOT AVAIL.	-
1978/79	75,391	64,309	139,700	17,110	156,810
1979/80	75,520	58,377	133,897	16,451	150,348

The most significant reduction in 1979/80 was a 9.2% decrease in the number of extensions. Total telephone sets decreased by 4.1% over 1978/79. The total number of federal government employees at consolidations has decreased by 3.1% from 275,086 in 1978/79 to 266,486 in 1979/80. The 2:1 ratio of government employees to telephone sets has remained constant.

Calling on the intercity shared network averaged 104,791 calls per day (including 28,994 operator-handled calls), based on an average holding time of six minutes. It should be noted that the figure of 37,557 average calls per day reported in the 1978/79 Annual Review represented peak daily operator-handled calls only.

The 1979/80 departmental telecommunications reports reveal a slight increase in overall expenditures for telephone service: \$113 million compared to \$112 million in 1978/79. The amount of this expenditure directly related to service provided by government telephone consolidations has remained constant at 40% (\$45 million).

### 3. Government Data Network Service (GDNS)

The transfer of users of the Toronto computer to the Montreal computer has been completed. These users now enjoy advantages offered by the Montreal computer such as improved GTA/CNCP trouble report handling.

In the 1979/80 fiscal year, the number of terminals increased by 12% to 1,068 and traffic by 4% to 4.8 million messages.

There are a significant number of terminal types now using the GDNS. Infomode intelligent terminals are currently transmitting at 300 bps over the network. The feasibility of support for 1200 bps ports on the GDNS computer is being studied. At GTA's request CN/CP is studying the feasibility of an interface between the GDNS and its new Infotex service.

4.        Teleprinter

There has been a decline in the number of terminals using TELEX/TWX services for the low-speed transmission of correspondence and records. Some departments have opted to use the GDNS to meet their needs in this application, while others have economized on the number of terminals required.

5.        Facsimile

The number of facsimile terminals has remained constant. Improved reporting reveals approximately 1,028 terminals are currently in use.

6.        Communicating Word Processors

The number of reported communicating word processors has increased to 52 terminals. Using the formula described in section 1, approximately 72 terminals would represent the total government use. Information from other sources indicates that this figure is not accurate. An attempt is being made to establish more reliable and comprehensive information on this type of equipment.

7.        Dial Access Data Terminals

The number of reported data terminals which may support several projects or programs has increased by a substantial 79% since 1978/79. Although the total of 949 terminals at March 31, 1980 reflects primarily improved departmental reporting, the increase is also due to increased lease/purchase of these terminals.

## APPENDIX C

### Directives and Guidelines

The directives and guidelines contained in the Guide on Telecommunications Administration and Chapter 430 (Telecommunications) of the Administrative Policy Manual are supplemented by "administrative practices" prepared by DOC and issued by Treasury Board. Each administrative practice circular covers a specific telecommunications service and defines features, service levels and acquisition procedures. It may be administrative and/or technical in nature. "Administrative procedures" are issued by the Government Telecommunications Agency and provide operationally oriented information to complement administrative practices.

During the reporting period two circulars were prepared by DOC, approved by the Telecommunications Advisory Committee and promulgated by Treasury Board. These covered Teleconferencing and Acquisition and Use of CNCP Inter-connected Services. In addition, GTA issued a circular outlining administrative procedures for the use of the government shared teleconference service.

Administrative practices for the Use of Long Distance Telephone Services and for the Provision of Telephone Services in the Official Languages will be recommended by DOC, in consultation with the TAC, for publication in the fall of 1980 as Treasury Board Circulars.

DOC has proposed the development of administrative practices for facsimile and PBX services. Departments are encouraged to recommend other subjects to DOC/GTA for which the development of administrative practices or service standards would be useful.

Chapter 430 of the Administrative Policy Manual is being revised to incorporate the Guide on Telecommunications Administration as well as references to these administrative practices and guidelines, thereby giving them more effect. The revised Chapter is to be issued in early 1981.





## APPENDIX D

### Status of Standards

The following summarizes the status of the CCITT X and S series recommendations for data communications standards. The CCITT Book containing these and other recommendations approved by the Seventh Plenary Assembly (1980) will be published in early 1981. Also included in this appendix is a chart depicting the relationship of standards institutions in Canada.

#### STATUS OF SERIES X RECOMMENDATIONS OF CCITT

##### SERVICE AND FACILITIES

- |     |   |               |
|-----|---|---------------|
| X.1 | International user classes of service in public data networks   | - RELEASED    |
| X.2 | International user facilities in public data networks   | - RELEASED    |
| X.3 | Packet assembly/disassembly (PAD) facility in a public data network   | - PROVISIONAL |
| X.4 | General structure of signals of International Alphabet No. 5 code for data transmission over public data networks | - RELEASED    |

##### INTERFACES

- |          |  |            |
|----------|--|------------|
| X.20     | Interface between data terminal equipment (DTE) and data circuit terminating equipment (DCE) for start-stop transmission services on public data networks        | - RELEASED |
| X.20 bis | V.21 compatible interface between data terminal equipment (DTE) and data circuit terminating equipment (DCE) for start-stop transmission on public data networks | - RELEASED |
| X.21     | General purpose interface between data terminal equipment (DTE) and data circuit terminating equipment (DCE) for synchronous operation on public data networks   | - RELEASED |
| X.21 bis | Use on public data networks of data terminal equipment (DTE) designed for interfacing to synchronous Series V Recommendations                                    | - RELEASED |
| X.22     | Multiplex DTE/DCE interface for user classes 3 - 6   | - DRAFT    |

- X.24 List of definitions for interchange circuits between data terminal equipment (DTE) and data circuit terminating equipment (DCE) on public data networks - RELEASED
- X.25 Interface between data terminal equipment (DTE) and data circuit terminating equipment (DCE) for terminals operating in the packet mode on public data networks - RELEASED
- X.26 Electrical characteristics for unbalanced double-current interchange circuits for general use with integrated circuit equipment in the field of data communications - RELEASED
- X.27 Electrical characteristics for balanced double-current interchange circuits for general use with integrated circuit equipment in the field of data communications - RELEASED
- X.28 DTE/DCE interface for a start-up mode DTE accessing the PAD - PROVISIONAL
- X.29 Procedures for the exchange of control information and user data between a packet-mode DTE and a PAD - PROVISIONAL

#### TRANSMISSION, SIGNALLING AND SWITCHING

- X.40 Standardization of frequency-shift modulated transmission systems for the provision of telegraph and data channels by frequency division of a primary group - RELEASED
- X.50 Fundamental parameters of a multiplexing scheme for the international interface between synchronous data networks - RELEASED
- X.50 bis Fundamental parameters of a 48 Kbit/sec. user rate synchronous transmission scheme - DRAFT
- X.51 Fundamental parameters of a multiplexing scheme of the international interface between synchronous data networks using 10-bit envelope structure - RELEASED
- X.51 bis Parameters of a 48 Kbit/sec. user rate synchronous transmission scheme with 10-bit envelope structure - DRAFT
- X.52 Method of encoding anisochronous signals into a synchronous user bearer - DRAFT

X.53	Numbering of channels on international multiplex links at 64 Kbit/sec.	- RELEASED
X.54	Allocation of channels on international multiplex links at 64 Kbit/sec.	- RELEASED
X.60	Common channel signalling for circuit switched data applications	- DRAFT
X.61	Signalling system No. 7 - data user part	- DRAFT
X.70	Terminal and transit control signalling system for start-stop services on international circuits between anisochronous data networks	- RELEASED
X.71	Decentralized terminal and transit control signalling system on international circuits between synchronous data networks	- RELEASED
X.75	Terminal and transit control procedures and data transfer system between packet switched data networks	- PROVISIONAL
X.80	Interworking of interchange signalling systems for circuit switched data services	- DRAFT
X.87	Principles and procedures for realization of international user facilities in public data networks	- DRAFT

#### NETWORK PARAMETERS AND HYPOTHETICAL REFERENCE CONNECTIONS

X.92	Hypothetical reference connections for public synchronous data networks	- RELEASED
X.96	Call progress signals in public data networks	- RELEASED
X.110	Routing principles for international public data networks of the same type	- DRAFT
X.121	International numbering plan for public data networks	- PROVISIONAL
X.130	Call set-up and clear-down times in circuit switched public data networks	- DRAFT
X.132	Grade of service in international data communications over circuit switched public data networks	- DRAFT

MAINTENANCE

- X.150 DTE and DCE test loops for public data networks  
in case of X.21 or A.21 bis interface - DRAFT

ADMINISTRATIVE ARRANGEMENTS

- X.180 Administrative arrangements for international  
closed user groups - DRAFT

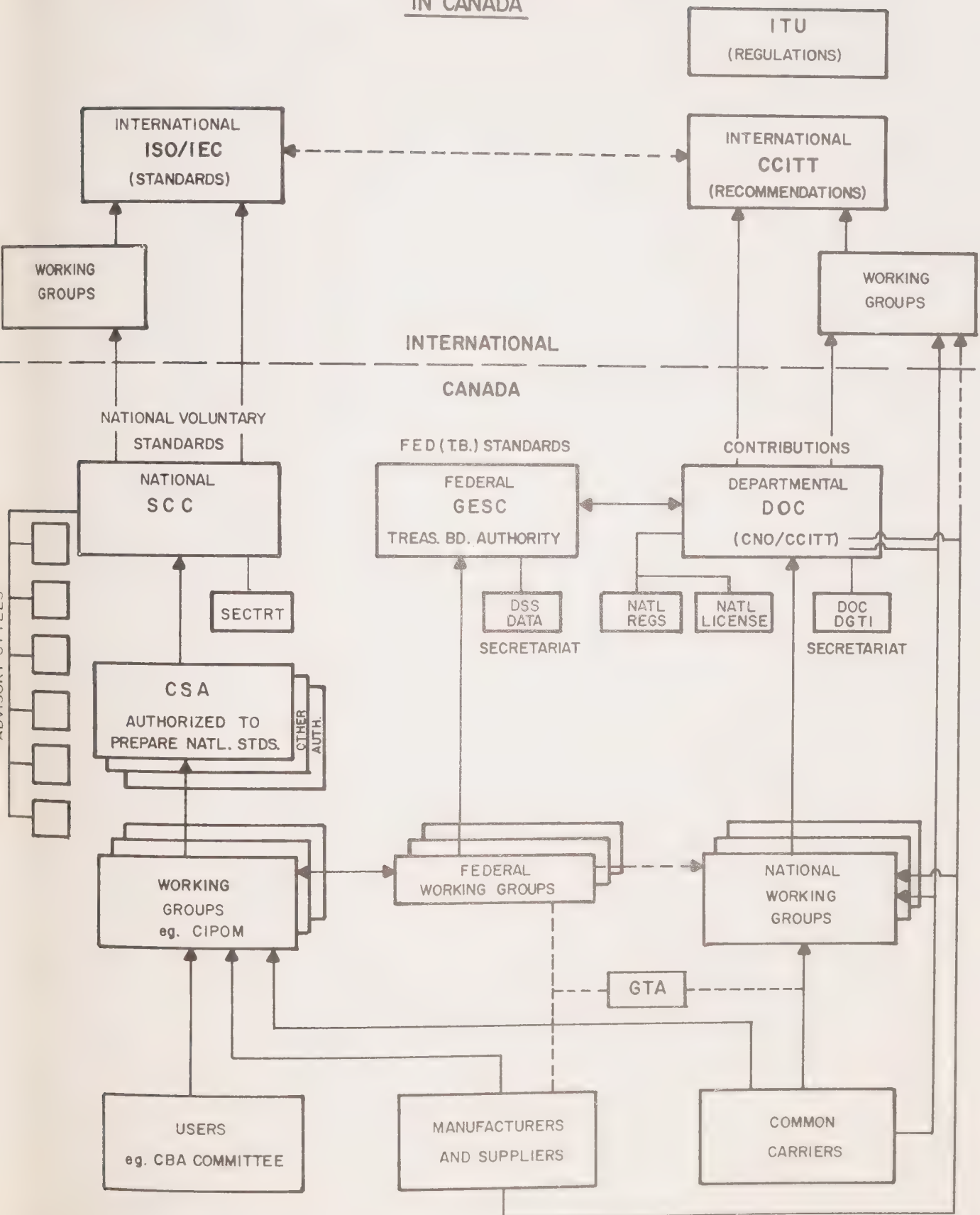
Note: Those recommendations marked "Provisional" or "Draft" will  
be submitted to the CCITT Plenary Assembly for approval in  
October, 1980.

## S SERIES RECOMMENDATIONS

- S.30 Standardization of basic model page printing machine  
using International Alphabet No. 5
- S.31 Transmission characteristics for start-stop data  
terminal equipment using International Alphabet No. 5
- S.32 Answerback units for 200 and 300 baud start-stop  
machines in accordance with recommendation S.30
- S.33 Standardization of an international text for the  
measurement of the margin of start-stop machines  
using International Alphabet No. 5



# STANDARDIZATION INSTITUTIONS IN CANADA





## APPENDIX E

### CONCEPTUAL DEFINITION OF AN AUTOMATED OFFICE NETWORK FOR THE FEDERAL GOVERNMENT

#### PREFACE

Last year's Annual Review identified the need for increased management awareness of the importance of telecommunications in the federal government and of the implications of worldwide developments in information handling. The next logical step was to provide material with which to understand these developments and take appropriate action. Departmental representatives at DOC seminars in early 1980 agreed with this approach.

On these grounds an Unsolicited Proposal to develop the Conceptual Definition of an Automated Office Network for the Federal Government was supported by the Government Telecommunications Agency, and a contract awarded to an independent consultant. The consultant's report is available to support departmental long range planning. It does not reflect DOC's views in all instances, particularly in the areas concerning time frames and employment.

This work has been carried out in close collaboration with representatives of the DOC Office Communications Systems Program and Computing Services Branch as well as representatives of other departments, to ensure that the results will be of practical use.

The reader is advised that the report is a conceptual definition, not a technical treatise or a blueprint for systems design. It is intended to provide management with an understanding of the foundations on which to plan and of the urgency of the need to plan.

The report alerts the reader to the savings potential in handling information with the aid of an automated office technology rather than conventional media such as paper, teletype and voice.

Copies of the report are available on request from the following address:

Department of Communications  
Journal Tower North  
300 Slater Street  
Ottawa K1A 0C8

Attention: GTA/DPC

(tel. 996-0144)





## APPENDIX F

### Reading Guide

The literature on telecommunications, office automation and information management is prolific. This section is intended to guide the reader towards particularly useful material.

### General

- . The Auditor General of Canada's Report for the fiscal year ended March 31, 1979 - Chapter 10 - Management of Telecommunications
- . Barron, I. and Curnow, R., "The Future with Microelectronics", Nichols Publishing Co., New York, 1979, 243 pages

A forecast of the social, industrial and economic effects of the microelectronics revolution from a U.K. perspective. Provides useful insights into policy and planning issues.

- . Economist Intelligence Unit, "Chips in the 1980's", London 1979, 57 pages

Focuses on the economic implications of chip technology.

- . Evans, Christopher, The Micro Millenium, The Viking Press, New York, 1980, 248 pages. Published in Great Britain in 1979 as The Mighty Micro

An immensely readable account of the emergence of machine intelligence and forecast of the global impact of the micro-processor to the year 2000. Highly recommended for layman and specialist alike.

- . Minutes of Proceedings and Evidence of The Standing Committee on Public Accounts, Respecting The Auditor General's Report for 1979 - Chapter 10 - Management of Telecommunications, June 17, 20 and 26, 1980.

### Subscription Services

- . "Computing Canada", Plesman Publications Ltd., 211 Consumers Road, Suite 302, Willowdale, Ontario M2J 4G8.

A bi-weekly newspaper with good coverage of the telecommunications industry.

- . "EDP Report", International Data Corporation, P.O. Box 915, 214 Third Avenue, Waltham, MA 02254

This report has a data processing and communications orientation, but is focusing on automation in the office and the home.

- . "Electronic Mail and Message Systems", International Resource Data Inc., 30 High Street, Norwalk, CT 06851

A twice-monthly newsletter covering technology, user, product and legislative trends in graphic and record communications.

- . "Gartner Group Technology Reports", The Gartner Group, 545 Steamboat Road, Greenwich, CT 06830

Provides useful overviews and analyses of communications-related topics, including both satellite and terrestrial systems.

- . "Maptek U.S.A.", (Management Action Program in Technology), Quantum Science Corporation, 1114 Avenue of the Americas, New York, N.Y. 10036

Briefs are provided to Maptek clients on technology-related issues and forecasts. This program is aimed specifically at management and provides excellent material.

- . "Office Automation Reporting Service" (OARS), International Data Corporation, P.O. Box 915, 214 Third Avenue, Waltham, MA 02254

Subscribers to this service receive monthly OARS reports supplemented by occasional special reports and update memos. An invaluable source of information on current and forecast equipment and services for management and technical people alike. See particularly the special report "A Compleat Guide to Electronic Messaging", December 1979, 48 pages.

- . "Telecommunications Policy", IPC Science and Technology Press Ltd., P.O. Box 63, Westbury House, Bury, Guildford, Surrey, England

Deals with the assessment, control and management of developments in telecommunications and information systems. Provides a mixture of layman-oriented and technical articles. Highly recommended to planners.

- . "The Electronics Communicator", Evert Communications Ltd., P.O. Box 3153, Ottawa K1Y 4J4

Provides valuable insight into issues affecting the Canadian electronics industry, including developments in the operating telecommunications industry, cable television, EDP and new products.

- . "The Telecommunicator", Evert Communications Ltd., P.O. Box 3153, Ottawa K1Y 4J4

A companion publication more oriented to telecommunications specifically.

- . "Word Processing Report", Geyer-McAllister Publications Inc., 51 Madison Ave., New York 10010, NY

A twice-monthly product update with an in-depth analysis of a new product each month.

### Information Providers

- . Input Market Analysis Service, "Market Opportunities for Data Base Services", Palo Alto, Ca., 1980

Provides a detailed analysis of the range of commercial data bases accessible via communications networks and the distribution methods employed.

- . Williamson, Robert, "Globe Publisher Foresees a Shakedown in Newspapers", "The Globe and Mail", May 28, 1980

### International

- . Background Report "Euronet DIANE", European Communities Commission, Reference ISEC/B19/80, April 25, 1980

- . "Euronet DIANE News"

A highly informative newsletter on Euronet developments, including periodic updates of data bases accessible through the network. Available free of charge from Euronet DIANE Information, Jean Monnet Bldg., B4 009, CEC, Luxembourg (Grand Duchy) telex 2752 eurdoc lu.

- . "Euronet DIANE: Towards an Information Common Market", Commission of the European Communities, Reference ED/CI
- . European Space Agency, "Space - Part of Europe's Environment", Paris, June 1979
- . InterMedia, "Film/TV/Video: The Changing Relationship", Vol. 8, No. 2, March 1980
- . InterMedia, "France Tightens PTT Monopoly", Vol. 8, No. 2, March 1980
- . Malik, Rex, "The EEC Challenge on Informatics", InterMedia, Vol. 8, No. 2, March 1980
- . "Status of Major FCC Inquiries", Business Communications Review, January - February 1980
- . The Computerization of Society, MIT Press, Cambridge, Mass., 1980

English translation of the MINC-NORA Report to the French President, 1978, entitled "L'informatisation de la société". Available from DOC Library. Highly recommended.

- . "The Plan for Information Society - A National Goal Toward Year 2000", Final Report of The Computerization Committee, Japan Computer Usage Development Institute, Tokyo, May 1972, 149 pages

Sets forth the plan subsequently adopted by the Japanese government to transform Japan into an information society by 1985. Highly recommended.

## Networks

- . National Library of Canada, Canadian Network Papers, Ottawa 1980

A series of papers on network development issues of which the first was published in 1980. Available from the Public Relations Office free of charge.

- . National Library of Canada, The Future of The National Library of Canada, Ottawa, 1980

Available from The Public Relations Office free of charge.

- . Strategic Business Services, "Computer Communications Networks of the Future", San Jose, Ca. 1980

An excellent, non-technical sequel to the two preceding SBS reports covered in the third Annual Review (viz. "Electronic vs. Paper Media" and "Impact of Interconnected Electronic Offices"). Projects developments over the two decades to 2000, with a focus on office communications networks.

## Office Automation

- . Buchanan, J.R., "Implementation Strategies for Office Automation Systems", in Proceedings of the 1980 Office Automation Conference, March 3-5, 1980, Atlanta, Georgia.

- . "Electronic Mail in the 1980's", International Resource Development Inc., Norwalk, Conn., 1979, 241 pages.

Examines equipment and service offerings expected during the decade and projects the size of the market, focusing on the U.S.

- . "Electronic Mail: User Alternatives in the 80's", Mackintosh International and Communications Studies and Planning Ltd., London 1980, 124 pages.

Aimed at the non-technical business user. Examines the scope and benefits of electronic mail equipment and services and offers advice on how to plan purchases.

- . Engel, G.H., Groppuso, J., Lowenstein, R.A. and Traub, W.G., "An Office Communications System", IBM Systems Journal, Vol. 18, No. 3, 1979

Account of the development of a prototype office communications system on the basis of a study of user requirements.

- . "Future Office Systems", Frost & Sullivan Inc., New York, 1980, 2 Vol.

Provides useful market forecasts.

- . Gruhn, A.M. and Hohl, A.C., "A Research Perspective on Computer-Assisted Office Work", IBM Systems Journal, Vol. 18, No.3, 1979

Description of tasks computerized at the IBM Research Centre, the environment and the reactions of users. Very helpful reading.

- . Kleins, J.E., "Conceptual Definition of an Automated Office Network for the Federal Government", prepared under contract for the Department of Communications, September 1980, 61 pages.

Supporting document to this edition of the Annual Review. Available from the Planning and Coordination Division, GTA.

- . Lodahl, T.M., "Cost-Benefit Concepts and Applications for Office Automation", in Proceedings of the 1980 Office Automation Conference, March 3-5, 1980, Atlanta, Georgia.

A helpful guide to concepts and major issues in the cost-benefit analysis of office systems. Includes a design and model for a novel approach.

- . "Strategic Implications for Office Automation Products and Markets", Booz, Allen and Hamilton Inc., July 1980

Provides valuable insight into the status of office automation in 15 U.S. companies along with strategies for implementation.

- . "The Report on Electronic Mail", The Yankee Group, Boston, Mass., 1980 163 pages.

Provides a good overview of developments in the equipment supplier and carrier industries in the U.S.

### People and Management

- . CIPS Review, Vol. 4, Issue No. 1, Jan/Feb. 1980

A special issue on the impact of technology on employment, including a presentation of the IRPP findings mentioned in section 3.7 of this Review.

- . Driscoll, James W., "People and The Automated Office", Datamation, Nov. 1979, pp. 106-112

- . "Informatics Sector Job Profiles", Employment and Immigration Canada, 1980

Contains the telecommunications job profile printed in an appendix to last year's Annual Review as well as others relating to information management. Intended as a standard basis for developing job descriptions for the informatics sector both in and outside government. Available from the EIC Occupational and Career Analysis and Development Branch.



### Product Innovations

- . Financial Post Special Report on Computers, March 8, 1980
- . Financial Post Special Report on Marketing and the Media in the 80's, March 15, 1980
- . Lester, Tom, "The Micro Future ... Now", Management Today, January 1980
- . Madden, John C., "Videotex in Canada", Computer Communications, Vol. 3 No. 2, April 1980
- . "Personal Computer for Professionals Provides Powerful Computation for Dedicated Applications", Computer Design, February 1980
- . Stamminger, R., "Teleconferencing in the 1980's", Signal, July 1980

### Regulatory

- . Schmidt, J.S., "Telecommunications and Constitutional Renewal: The Information Age Demands a Strong National Dimension", Computing Canada, Aug. 5, 1980

### Technology

- . Computer Design, "Plug-In Voice Recognition Module Offers 100-Word Vocabulary", February 1980, p. 58
- . Computer Design, "Word/Data Processing Integrated with Electronic Message Systems", February 1980, p. 66
- . Friedman, Robert F., "Trends in Earth Station and Surface Telecommunications Technologies", Satellite Communications, August 1979, pp. 28-31.
- . Langhans, R.A. and Mitchell, T.H., "Linking the Satellite to a Data Communications Net", Data Communications, February 1980, pp. 99-110.
- . Leger, G.L., "LSI Ready to Make a Mark on Packet-Switching Networks", Electronics, Dec. 20, 1979, pp. 89-94
- . Mosher, Peter, "Light Beam Puts Machines to Work", The Globe and Mail, February 25, 1980
- . Stein, David L., "Price/Performance, Semiconductors and the Future", Datamation

## University and Government Research

- . Buhr, R.J.A. and MacKinnon, D.A., "Word Teleprocessing Interface", Carleton University for the Department of Communications, Contract No. OSU79-00174, March 31, 1980

Provides functional and communications profiles of five commercially available word processors, an analysis of the extent of communication possible between them and recommendations on how the obstacles to communication could be overcome. Available from the Development and Engineering Division, GTA.

- . Buhr, R.J.A., Mahmoud, S.A., and Toth, K., "Open Systems Interconnection: Application Issues Associated with the ISO and CCITT Layered Models", Carleton University for the Department of Communications, Contract No. OSU79-00173, March 31, 1980

Provides an insight into the issues and problems associated with developing Canadian standards for multifunctional terminals capable of interworking over a variety of national and international network services. Available from the Network Research Branch, DOC.

- . Coll, D.C., Strickland, L.H., Morawski, J.G., Palys, T.S. and Baker-Brown, G., "Telecommunications and Decentralization", Carleton University for the Department of Communications, Contract No. OSU79-00140, March 15, 1980

Presents a review of literature on telecommunications and decentralization with emphasis on organizational effectiveness, an inventory of current and emerging communications alternatives and their potential, and recommendations. The emphasis is on considering communications implications of decentralization plans early. Available from the Development and Engineering Division, GTA.

- . Finley, M.R. and Vo-Dai, T., "A Technical and Economic Study on the Impact of the Introduction of New Services on Existing Telecommunications Networks", Université Laval for the Department of Communications, Contract No. 20ST.36100-9-9525, March 20, 1980

Available from the Development and Engineering Division, GTA.

- . Germain, P., "Toward a Training Policy for Scientific and Technical Information Managers in the Government", for the Department of Communications, January 1979

Available from Research Policy and Planning, DOC.

- . Greenleaf, B.E., Power P.J. and Wootton, B.A., "A Study of High Level Protocols for Open System Interconnection", Systemhouse Ltd. for the Department of Communications, September, 1980

Exploration of the issues involved in developing unified Canadian standards for higher level protocols.

- . Kwong, R.H., Leon-Garcia, A. and Venetsonopoulos, A.N., "A Study of a Joint Stochastic Process for an Integrated Network", University of Toronto for the Department of Communications, Contract No. OSU79-00041, March 31, 1980

Examines stochastic processes arising in a hybrid-switched integrated voice/data network. Available from the Development and Engineering Division, GTA.

- . "R & D Bulletin", Department of Supply and Services

A free monthly publication listing contracts awarded during the previous month and projects for which requests for proposals are expected.

- . Serafini, S. and Andrieu, M., "The Information Revolution and its Implications for Canada", Communications Economics Branch, DOC, May 1980
- . Stolovitch, H.D., "A Study of the Economic, Policy and Institutional Issues Influencing the Use of Satellite Based Telecommunication Facilities for Public Services", Université de Montréal, for the Department of Communications, March 1979, Contract No. 05U78-00218







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# Annual Review of Telecommunications in the Government of Canada 1980/81

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Gouvernement du Canada  
Ministère des Communications



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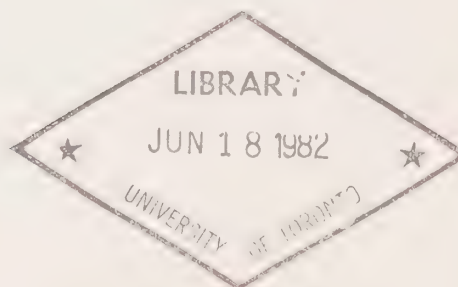


ANNUAL REVIEW OF TELECOMMUNICATIONS  
IN THE GOVERNMENT OF CANADA  
1980/1981

PREPARED BY THE

PLANNING AND COORDINATION DIVISION  
GOVERNMENT TELECOMMUNICATIONS AGENCY  
DEPARTMENT OF COMMUNICATIONS

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Table of Contents

	<u>Page</u>
A. <u>Executive Summary</u>	
1. Current Status	1
2. Key Recommendations	3
B. <u>Long Range Planning Framework</u>	
1. Introduction	4
2. Environmental Factors	7
2.1 Government Planning Instruments	7
2.2 Legislative Influences	8
2.3 Regulatory Influences	10
2.4 Economic Influences	14
2.5 Social Influences	16
2.6 Available and Emerging Technologies	18
2.7 Government Research and Development	20
2.8 Standards	31
2.9 Summary	34
3. Survey of Transmission Facility Suppliers	35
4. Survey of Equipment Suppliers	40
5. Survey of Information Providers	44
6. Analysis of Departmental Plans	46
7. Government Telecommunications Agency Development Program	47
8. Case Study in Designing an Organization for Office Communications Systems Development - Introduction	51
9. Case Study in Financing Office Automation Development	52



	<u>Page</u>
C. <u>Administrative Policy Analysis</u>	53
1.     Introduction	53
2.     Telecommunications Policy Development Process	55
3.     Report on Past Year	58
3.1    Administrative Policy	58
3.2    Telecommunications Personnel	60
3.3    Digital Multiplexing - Policy Considerations	63
3.4    Interconnect/Terminal Attachment - Policy Considerations	64
3.5    OCS Program	65
3.6    Policy Issues: Case Studies	66
4.     Office Automation: Opportunities and Problems	68
4.1    The User	68
4.2    Productivity	69
4.3    Organizational Structure	70
4.4    Human Factors	71
4.5    Cost Justification	72
5.     Policy Issues	73
5.1    Organizational Issues	73
5.2    People Issues	77
5.3    Management Issues	78
5.4    Summary	78
D. <u>Recommendations</u>	79
E. <u>Appendices</u>	
1.     Telecommunications Expenditures, Personnel and Systems	
2.     Detailed Analysis of Departmental Plans	
3.     Case Study in Designing an Organization for Office Communications Systems Development	
4.     Policy Issues: Case Studies	
4.1    Revenue Canada - Taxation	
4.2    Employment and Immigration Commission	
4.3    DOC Field Trial - Communicating Word Processors (CWP)	
5.     Principles for Conducting Pilot Projects	
6.     Reading/Viewing Guide	

## A. Executive Summary

### 1. Current Status

#### Expenditures and Personnel

Annual Telecommunications Reports and Plans were requested in 1981 from the 59 departments and agencies whose telecommunications expenditures represent 98.4% of the total for the federal government. 1980/81 telecommunications costs, including personnel, were over \$408 million. Reporting departments and agencies again encountered difficulties in identifying and reporting telecommunications expenditures in a timely and accurate manner. These difficulties should diminish now that Treasury Board Canada has issued Chapters 435 and 436 of the Administrative Policy Manual.

The data collected show that total telecommunications expenditures including those relating to telecommunications personnel increased by 16.8% over the previous year. A closer look at total telecommunications expenditures reveals that operating expenditures increased by 5.7% to \$202.5 million, capital expenditures by 46.9% to \$72.2 million and personnel related expenditures by 22.7% to \$133.5 million.

The following factors are considered to have affected 1980/81 telecommunications expenditures:

- significant increases in tariffs;
- upgrading of existing services, contributing to a significant increase in capital expenditures;
- increased emphasis on the quality of telecommunications management, resulting in increases in telecommunications personnel;
- the adoption of new technologies by organizations with a view to increasing efficiency.

A total of 7102 telecommunications person-years were reported for 1980/81, up 16.7% from 1979/80. Reporting departments and agencies forecast an average growth rate in person-years of 3.4% per annum over the next five years.

Total telecommunications expenditures including telecommunications personnel related expenditures have been forecast to increase by 17.5% in 1981/82 and at rates of between 13.7% and 14.5% per annum for the years 1982/83 - 1985/86.

Details are contained in Appendix 1.

## Systems Inventory

This Annual Review reports on action taken to correct problems associated with the inventory of government telecommunications systems, in particular the deficiency of contents and lack of ready access to useful data. Appendix 1 contains details concerning the inventory, defines departmental responsibilities and outlines activities initiated by the Department of Communications to satisfy inventory needs.

## Planning

There is evidence that comprehensive long range communications plans are now being developed in some major departments and agencies, but these are still in the minority. Many federal organizations report only short term plans focusing on the acquisition of a particular device, or report that they foresee no significant change in their communications systems over the next five years. The latter observation is particularly common among smaller organizations, which are less likely to keep informed of communications systems developments. Where plans are reported the most common objectives are service improvement and cost reduction.

Most organizations of any size are investigating the potential of automating their business communications. For example, six major user departments report the establishment of an office automation task force. However, with the exception of initiatives in five departments the network development projects reported do not show signs of being planned to accommodate an integrated flow of information over the longer term. This can only happen when the telecommunications, data processing and user communities collaborate with each other in the planning and development of new systems. An example of substantial progress in this direction is presented as a case study in Appendix 3 of this Review. Future editions of this document will seek out more initiatives of the kind and bring them to the attention of other departments and agencies.

## Policy

The administrative telecommunications policy analysis section is a new component of the Annual Review and has been initiated to provide a focus for the discussion of issues, problems and opportunities related to telecommunications and information technology in the federal environment.

Highlighted as part of this new section are a description of the telecommunications administrative policy development process, a report on activities during the past year, an identification of both the opportunities and problems associated with office automation within the federal government, and an analysis of major policy issues, including the need for attention to communications security. Appendix 4 presents three case studies which delineate projects from three phases of telecommunications and office automation development. Appendix 5 outlines 10 principles for the conduct of pilot projects for telecommunications/ information technology/office automation applications.

## 2. Key Recommendations

Key recommendations concern the need for harmonization of telecommunications and EDP planning; for increased dissemination by the Government Telecommunications Agency of information which will improve the quality of telecommunications management; and for departments to allocate resources to training and stimulating awareness of developments in communications.

## B. Long Range Planning Framework

### 1. Introduction

The previous edition of this Annual Review proposed strategic objectives for the development of the government telecommunications system. These objectives were based on the minimum evolution required during this decade to keep pace with office communications systems being developed in the private sector. The target proposed for 1985 was the automation of key business functions in at least five major departments and the linking of these departmental systems in a network. For 1990 it was proposed that major business functions be automated throughout the federal government and all departments linked in a network to each other, provincial governments and businesses.

To make it possible for departments to plan and implement independently office communications systems which could be linked over time, the concept of a fully integrated federal government office network was defined in a supporting document. This Conceptual Definition is envisaged as the first step in a process which would provide departments each year with progressively more concrete guidance on how to plan office communications systems. Advice will be based largely on the practical experience of departments in the vanguard of developments in the federal government.

It is gratifying to be able to report that Telecommunications Coordinators and other members of the federal government telecommunications community welcomed this approach when polled at the spring seminar on annual reporting requirements, and urged the Department of Communications to proceed with the strategy. Deputy Ministers have also made it clear that they support the contents of the Annual Review and have found it useful in their departments. The Conceptual Definition has been widely read at senior levels throughout the government and is being used, as intended, as a point of departure for office communications systems planning in some departments.

The spring seminar however also confirmed that very few departments had yet established organizations capable of acting on the planning guidelines provided. Such an organization must have a mandate to develop information resource management systems and must draw together expertise from the telecommunications, data processing and administrative communities. Few such organizations yet exist outside major corporations, and practical prescriptions for setting one up are hard to find. For example, the U.S. government established information resource management (IRM) as a mandatory government management concept in the Paperwork Reduction Act of 1980 but has had little success in implementing it. The problem is in part the difficulty of making a single senior official in each agency responsible for developing policy and overseeing all information resources, as required by the Act.



Recognizing that little real progress will be made towards the strategic objectives until departments have the appropriate capability in place, we focus in this edition on how to get organized. An approach based on experimentation in some major departments is introduced in Section B.8 and elaborated in Appendix 3. Both the structure and the agenda for an office communications systems development group are outlined. Section B.9 examines one department's plans for financing office automation out of savings which will accrue from switching communications media, as recommended in the previous Annual Review.

To qualify for a place in the development group, and eventually in the information resource management organization, telecommunications managers must broaden their perspective and recognize that their responsibility starts before the user requests a service. They must make a commitment to develop expertise in innovative communications systems and apply it to anticipating the changing needs of users. In short, they must learn to plan.

Ronald Frank, writing in the March-April 1981 edition of the "Business Communications Review", pointed out that telecommunications staff can assure themselves a place in the forefront of the corporate planning process by becoming involved in the first stage of the development of an integrated network, when spare capacity on existing data transmission facilities begins to be used for new applications. As the character of the network changes from data to corporate communications and it starts to be regarded as a corporate asset, the telecommunications specialist can develop into a valued member of the information management staff.

Seizing this opportunity will be a challenge for telecommunications staff throughout business and government, because telecommunications management is an underdeveloped discipline. In the same edition of the "Business Communications Review", Michael Finneran identified five phases in the management of telecommunications. These ranged from non management, characterized by outright neglect, to integrated management, characterized by "a synthesis of the business and technical concerns, and the incorporation of telecommunications into a larger information systems organization." Very few organizations had progressed past Phase Three, according to Finneran. A summary of the characteristics of the phases is reproduced on the next page.

Organizations within the federal government accounting for over 70% of telecommunications expenditures involve significant technical management. Annual Telecommunications Reports and Plans have shown a steady improvement in content, with emphasis on the need to improve telecommunications management. This planning framework aims to provide practical tools with which to make the eventual transition to Phase Five possible throughout the federal government.

### Characteristics of Telecom Management Phases

<u>Phase</u>	<u>Main Focus</u>	<u>Charter</u>	<u>Strategy</u>	<u>Technical Sophistication</u>	<u>Business Applications</u>	<u>Management Exposure</u>
1. Non-Management	Provide Service	None	None	None	None	None
2. Cost Management	Reduce expense	Control cost. Provide Service	None	Minimal	None	Minimal
3. Technical Management	Reduce expense and gain recognition	Control cost. Provide Service	High technology	Significant	None	Minimal
4. Business Telecom- munications Management	Reduce net expenses, contribute to profitability	Cost effectiveness	Apply management to telecommunications	Greater, but a lower level concern	Beginning	Significant
5. Integrated Telecom- munications Management	Manage technology in solving business problems	Cost effectiveness: Technology in the organization	To help in reshaping the business based on knowledge of the company's operations, philosophy and the existing and promised technology	Great, but a lower level concern	Very Important	Great

## 2. Environmental Analysis

This section reviews developments in the legislative, regulatory, economic, social and technical environments which should influence telecommunications planning.

### 2.1 Government Planning Instruments

Communications systems planners should be aware of the multi-year planning and management process implemented in 1980 to improve the calibre of planning in the federal government. The principal instruments of this process are:

- The Fiscal Plan, established by Cabinet and central agencies, which sets overall government spending limits for each of five following years. Under this umbrella funds are allocated annually to resource envelopes according to current government priorities.
- The Strategic Overview, prepared by each department to provide an overall perspective on its plans for the five years and to permit these plans to be related to government priorities.
- The Multi-Year Operational Plan, in which each department specifies its goals and the expected results and cost of planned programs for the five years.
- The Budget Year Operational Plan, which is the first year of the Multi-Year Plan and provides detailed information on the work to be undertaken and its cost.

All of these documents are updated annually to reflect changes in government objectives and priorities. A complete description of this process is found in the Guide to the Policy and Expenditure Management System, Treasury Board Canada, 1980.

Telecommunications plans should provide for the development of systems which help the department to achieve the goals set forth in its Strategic Overview. They should also form an integral part of both the Multi-Year and the Budget Year Operational Plans. This implies that those who are responsible for the Annual Telecommunications Report and Plan must participate in the corporate planning process.

The telecommunications community should also be aware of the work of the Office of the Comptroller General to encourage both corporate planning and long range information systems planning, including telecommunications, under the IMPAC (Improvement in Management Practices and Controls) Program.

Finally, departmental management should note that the revised policy on Telecommunications Administration contained in Chapter 435 of the Treasury Board Administrative Policy Manual requires that provision be made for better control of telecommunications expenditures and more attention to long range planning.

## 2.2 Legislative Influences

The Canada Post Corporation Act (Bill C-42) was given royal assent in April and came into effect in the fall of 1981, transforming the Post Office into a crown corporation. The significant feature of this legislation for communications systems planners is that the monopoly of the new corporation does not extend to electronic mail, nor urgent mail as long as it is delivered by courier services charging at least three times first class letter rate.

New telecommunications legislation is planned at the federal level to set broad objectives for the nation's telecommunications system, define the relationship between its parts and deal with issues raised by the revolution in communications technology. In the absence of up to date legislation, policy has tended to be established by regulatory decisions of the CRTC. Bill C-16, the proposed unified Telecommunications Act, would strengthen the policy making role of the Minister of Communications, but at the time of writing a timetable had yet to be established for introduction of the legislation. In addition, Alberta, Ontario and Nova Scotia are preparing new communications legislation, and Saskatchewan will be introducing legislation in the current session to create a Department of Communications.

The 1981 summer recess precluded passage of Bill C-43 (Privacy and Access to Information). The bill has been considerably modified since it was originally tabled, the overall impact being to provide easier public access to government held information and shift the burden of cost to the government. For example, fees for access and the transition period originally allowed departments to comply with the provisions of the legislation have been eliminated.

Freedom of Information legislation is also being prepared by Ontario and Quebec following reports from their respective task forces, and similar legislation is in place in Nova Scotia and New Brunswick.

Earlier editions of this Review have forecast that this legislation will result in considerable strain on the traditional channels of communication with the public and stimulate the development of intersectoral networks, as departments struggle to respond to enquiries with existing resources. It is clear that before access to information can be automated, a daunting task of organizing records remains to be tackled.



In a mid 1980 pilot study of 13 departments and agencies, the Treasury Board Task Force charged with preparing policies and procedures with which to implement the legislation found that records were not in general organized for efficient access, and recommended that they be overhauled during the following two years.

Planners should look beyond this stage and count on providing systems to digitize massive volumes of information and distribute it electronically in the next three or four years. This means collaborating with records and library management staff who can contribute professional skills in information organization and dissemination. It means planning for the acquisition of optical page readers, particularly those which can be interfaced to communications facilities. It also implies a need for the acquisition of software to enable non experts to define and structure data bases for automated access. Telidon terminals are now being used on an experimental basis across the country to provide access to government information, and may become a more widely used delivery medium. (See section B.5 - Information Providers).

One potential, if indirect, outcome of freedom of information legislation which should be of interest to communications systems planners is illustrated by recent developments in the United States, where such a law was passed some years ago and has resulted in exponentially increasing administrative costs. As of April 1, 1981, a Paperwork Reduction Act is in effect encouraging federal agencies and those who provide information to the government to use automated information processing equipment and telecommunications to reduce waste and fraud and improve productivity. The intent is to cut back paperwork by at least 25% over three years. The provisions of this act cover the collection, use and auditing of information, and establish a Federal Information Locator System to prevent duplication of holdings.

A task force is working to revise the 1924 Copyright Act, and the revision is to be introduced jointly by the Ministers of Communications and Consumer and Corporate Affairs by mid 1982. This has been declared a priority by the sponsoring ministers in light of current cultural conditions and the rapid development of technologies which are incompatible with traditional notions of copyright.



### 2.3 Regulatory Influences

The General Climate - In keeping with the expanding range of technology available to provide communications services, regulatory decisions continue to favour competition in the telecommunications sector. In its June 1981 report entitled "Reforming Regulation", the Economic Council of Canada noted that basic questions are being asked about whether regulation is appropriate for new service offerings and whether it can be justified at all under the technological conditions of the 1980s.

The Council concluded that no case had been established for restricting competition in the telecommunications market beyond basic telephone service, and that even in this domain alternatives are emerging which undermine the validity of the traditional view of telecommunications as a natural monopoly. The report follows two parliamentary studies which have recommended regulatory reform. The combined effect of the three is considered likely to result in substantial changes to the regulatory environment, although not immediately.

This movement towards liberalization of regulation parallels a trend evident in the United States for some time, although at a slower pace and in a less comprehensive form. The data communications market has been competitive for a decade in Canada, but the CRTC interim decision on attachment of terminal devices to the telephone network, reported in the previous Review, followed a similar U.S. decision by 11 years.

The interim decision permits all subscriber-provided terminal equipment complying with certain technical and other conditions to be attached to Bell Canada facilities during the period preceding the final decision. A joint statement by the Ministers of Communications and Industry, Trade and Commerce in May 1981 announced that the Cabinet had upheld the CRTC interim decision, turning down petitions to the Governor in Council from Bell Canada and the Ontario Government to vary or rescind it. The government is aware of the possible effects of the liberalization of terminal attachment regulations, and the two departments are planning a joint study of its impact on Canadian industry and trade.

In the same May statement Cabinet endorsed the substitution of Canadian standards developed by the Terminal Attachment Program Advisory Committee (TAPAC) for those originally permitted by the CRTC. In a decision issued in November, the CRTC substituted the TAPAC standard for the Bell Canada standard specified in the interim decision, but retained the U.S. Federal Communications Commission (FCC) standards. In another decision issued in October the Commission extended the conditions of the interim decision to BC Tel.

The public hearing from which the final decision will ensue was held from November 17 to December 11, 1981. The proceedings were broadened to cover all federally regulated carriers, i.e. BC Tel, Northwest Tel, Terra Nova Tel and CNCP as well as Bell Canada. The final decision will apply to them all.

In its brief to the CRTC in preparation for the November hearing, Bell Canada took the position that it will accept all-out competition provided that certain conditions are met. Of particular interest are Bell submissions that it should be allowed to compete in the attachment market on equal terms through non-regulated arm's length subsidiaries, and that imports of equipment for attachment in Bell territory be allowed only from countries having reciprocity treaties with Canada. In fact, Bell has already established a direct sales organization (Bell Communications Systems). Bell's voluntary acceptance of competition for the supply of terminal equipment is encouraging for the user because it eliminates a significant number of potential maintenance and billing problems in the use of attachment devices.

As a result of the interim decision, departmental managers have been faced with a suddenly much larger choice of equipment and services and have been inundated by vendor marketing. These developments add enormously to the complexity of systems planning and procurement, severely taxing the already limited pool of telecommunications expertise in the federal government. On the other hand, they have also made senior managers more aware of the importance and challenge of telecommunications planning and management.

It is likely that managers across the country will face the same challenge, since regulatory policy is developing along parallel lines at the provincial level. Alberta Government Telephones (AGT) has filed an application with the Alberta Public Utilities Board favouring the liberalization of terminal attachment regulations in its territory and the adoption of TAPAC technical standards. Nova Scotia is expected to initiate action soon to modify its current requirement that only communications utilities interconnect with Maritime Telephone and Telegraph.

Other recent decisions of the CRTC have reflected a pro-competition orientation. For example, in a decision issued November 24, 1981 the CRTC granted CNCP the right to interconnect with BC Tel under the same terms and conditions as with Bell Canada in 1979. To take another example, Bell Canada was authorized in May to conduct a nine month market trial of Call Relay Service (for call forwarding) in the Hamilton, Ontario area under a TCTS contract, but informed that it must make lines available to organizations offering a competing service.

Both Call Relay and Envoy can be regarded as examples of value-added, or enhanced communications services. Such services have long been established in the United States (e.g. Telenet, Tymnet, Satellite Business Services), but are rare so far in Canada. Before a policy can be developed on the regulation of value added services, certain key issues must be dealt with. The CRTC has announced its intention to hold a major public hearing to establish guidelines for the provision of enhanced services. It is unlikely that a decision on this issue would be available before late 1983.

In July 1981 the CRTC released Decision 81-13 which inter alia ordered Telesat to lower its satellite tariffs and lease whole and partial satellite channels directly to end users. The decision was generally favoured by users and opposed by the carriers and many of the provinces. It was suspended by the Governor in Council in order that its full implications could be reviewed. At the conclusion of the review, Decision 81-13 was varied to eliminate the requirement that Telesat deal directly with potential users other than broadcasting undertakings. Bell Canada and BC Tel were however ordered to file tariffs for the provision of satellite services, thereby satisfying the principal demands of business users. The variance altered no other portions of 81-13, and has been generally well received by the interested parties.

Rates - Applications for substantial rate increases have been filed by all federally regulated carriers since the beginning of the year. In February, six months after being granted a substantial general rate increase, Bell Canada applied for a further general increase. The application included a proposal to raise basic business service rates by 40%. Protests from subscribers have been stronger in this than in previous cases. A number of user organizations intervened at the hearings. The CRTC decision of late September allowed local business rates to rise by only 15%. Long distance rate increases however averaged 19%, or about what Bell asked for. Bell was also ordered to increase the revenue from the competitive portion of its business. On balance, the effect of the decision will be to increase the level of apparent cross-subsidization of local service by raising the price of toll service further above cost.

In January 1981 BC Tel was granted substantially all the increases it applied for in the general rate application of March 1980, and its individual business service rate increased by 15%. In June and November 1981 the company filed for interim and general rate increases respectively. The combined effect of the interim rate increase already granted (to take effect January 1, 1982) and the general rate increase applied for (to take effect May 1, 1982) would raise the rate for local business service by 37% and the rate for WATS by 3.3%.

A public hearing on CNCP's application for a general rate increase was held in October 1981. If the application is approved in full, rental charges for telex terminals will rise by 25%, from \$60 to \$75. An interim increase of 13.5% in telex usage charges, sought for September 1, 1981, was denied.

Users should reckon on a rate application from Bell Canada every 12 to 18 months for as long as inflation continues to outpace productivity growth. Since all carriers face the same cost/revenue squeeze, similar applications should be expected from other common carriers.

DOC Radio Spectrum Management - The Department of Communications is conducting a review of intercity microwave licensing policy. A total of thirty submissions have been received, the majority from cablecasters, broadcasters and telephone companies. The thrust of the submissions from broadcasters is that more radio spectrum should be allocated for intercity signal delivery and that policy should be liberalized to permit private microwave systems to be licensed. The telephone companies promote the opposite view. An attendant issue under consideration is the Minister's power to regulate such matters as the type of services which may be offered by means of a radiocommunication system and the charges which may be made in the absence of other relevant federal regulation.

A discussion paper on licensing policy for cellular mobile radio and preliminary mobile satellite planning was released in October 1981. Public comment is being solicited by the end of February 1982, after which a licensing policy for cellular mobile radio in the 806-890 Mhz band will be established. This policy will take into account plans for the mobile satellite (MSAT) demonstration system in which commercial services may be licensed. (See Section B.2.7.1.4.2.)

Earth station licensing policy is under review and will be revised by the year end. Current policy makes licences available to telecommunications carriers, broadcasting undertakings and provincial educational authorities for receive only earth stations operating in conjunction with Canadian satellites.



## 2.4 Economic Influences

During the past year the extraordinary has become the norm in the economic environment. At the time of writing, inflation and interest rates in Canada hover around 13% and 23% respectively and the Canadian dollar is recovering slightly from a 50 year low measured against its U.S. counterpart. Prospects for an early return to more favorable conditions are not promising, and even experts are unwilling to forecast economic conditions with any certainty. In these circumstances growth is squeezed and the perspective shifts to doing more with less, or using given resources more productively.

Improving productivity is of utmost importance because it is a key to combatting inflation. Productivity has been falling in Canada for three consecutive years and is expected to do so again in 1981, although not by as much as the 2.7% decline in real GNP per worker experienced in 1980. Meanwhile wages keep rising, leading to an excess of cash chasing scarce goods and services, which in turn leads to price escalation. Improving productivity makes more goods and services available, driving down prices while leaving wages intact.

Studies have shown that technological innovation is three to four times more effective than other means of increasing productivity, including capital investment and achievement of economies of scale. With this in mind the U.S. federal government is actively encouraging the use of automated systems in its offices, and the governments of Japan and the U.K. are urging industry to employ robot labour. Several studies of the status and potential of robots in Canadian industry have recently been sponsored by the Department of Supply and Services.

The definition of productivity is being broadened to include effectiveness (the "quality" dimension of the output) as well as the traditional notion of efficiency (the "quantity" dimension), as organizations tackle the task of cost justifying investments in office technology. Improved organizational effectiveness is expected to result in the later stages of office automation, once integrated networks are in place to provide enhanced communications capability. Meanwhile the focus is on clerical, then managerial efficiency. To achieve the ultimate benefit, office systems must be designed from the start with the objective of integration in mind.

Communications is one area in which major economies of scale can still be achieved. High capacity lines cost considerably less than a collection of low capacity lines handling an equivalent volume of traffic. This fact is encouraging the use of techniques for compressing voice and data signals, the sharing of network



facilities and the integration of networks originally developed to serve specific functions such as sales reporting, engineering and so forth. Integration of networks after the fact can be enormously expensive and is sometimes abandoned for this reason, leaving the organization in a poor position to compete with others offering better service over a unified network. Cost is therefore another compelling reason for adopting a longer term planning perspective.

Despite the high cost of office automation systems, businesses expect an early return on their investment. By the mid decade economic arguments will be compelling. For example, postage rates will rise by 76% on January 1, 1982, resulting in an extra annual expenditure of \$760,000 on a budget of \$1 million, which is common in larger government departments.

To take another example, using the rule of thumb that Toronto office space costs follow those of New York by four or five years, one can expect prime downtown space to cost \$100-150 per square foot by 1985. At this rate a filing cabinet takes up more than \$1,000 worth of space, and it becomes necessary to consider alternatives such as work from home. Many U.S. firms are now actively encouraging their employees to adopt this habit. In general, office costs have been found to be rising at the rate of 12-15% per annum. At this rate they will double by the middle of the decade if no corrective action is taken. Businesses cannot absorb such increases and are learning that there is no option to proceeding with automation in the office.

A certain amount of practical experience with the costs and benefits of automating office communications has now been gained in some departments. In keeping with the commitment made in the previous Annual Review, certain results are referred to here in Section B.9 - Case Study in Financing Office Automation Development.

## 2.5 Social Influences

The previous Review explored trends in employment, education and organizational structures expected to result from the widespread application of information technology. The point was made that little research is being conducted in North America into the potential impact in these areas, even though the need is recognized for comprehensive pre-impact analysis and an informed public. The potential social impact has a higher public profile in Europe.

Research is still limited in North America but more work has recently begun to appear on these subjects. Forecasts of the impact on employment are still conflicting. "Women and the Chip" published by the Institute for Research on Public Policy, and "The Employment Implications of Computer and Telecommunications Technology" jointly commissioned by DOC, Labour and Employment and Immigration, both used case studies of Canadian business yet drew opposite conclusions about employment prospects in the electronic work environment. One is forced to conclude that it is too early to judge with confidence where the balance will be struck once the technology has been implemented extensively.

Regardless of the effect on numbers of people employed, a fundamental change in skill requirements for office work is certain and imminent. Already the demand for people with computer and communications systems skills far outstrips the supply and has become a major obstacle to innovation. The same shortage applies to high calibre clerical and administrative staffs. The crisis will become more acute, in part because the number of people in the 18-34 age group is expected to drop by 30% over the period 1980-85, while the 35-45 year age group, mainly higher paid and with no experience of the new technology, increases by a corresponding amount.

The 1981 Employment and Immigration Task Force Report on Labour Market Development recommends that educational institutions be encouraged to produce more graduates with technological skills, but suggests that immigration is the only remedy in the short term. A July, 1981 Science Council report reiterates this message. However, the skills needed are now in urgent demand and well paid throughout the world, so immigration is not an automatic solution. The problem of skills shortages has been recognized in the federal government, particularly in the telecommunications and data processing sectors which are most affected.

Many organizations have begun to establish their own training programs to develop needed expertise, and unions are becoming more outspoken about requirements for mass training. The President of the Ontario Federation of Labour recently proposed that the European practice of allocating 1.5% of organization budgets to training and development be adopted in Canada, and a tax imposed on firms not spending at this level.

Fortunately, the very technology which presents such a challenge to the skills of the current work force is also bringing within reach of the mass market the means with which to meet the challenge. Hundreds of thousands of personal computers are now being sold to the education market, and educational software is becoming big business. Deltak, which produces videocassette-based courses on information management, has announced course authoring software which runs on a microprocessor and the National Research Centre is working on the same capability. This courseware enables users of personal computers to develop their own computer aided learning packages.

These developments are related to a pronounced trend away from traditional educational institutions and methods and the striking popularity of informal approaches offering highly specialized content. The explosive growth of the Network for Learning in New York and its predecessor, The Skills Exchange in Toronto, attended by 30,000 students per year, is symptomatic of the phenomenon. New technologies will reinforce this trend.

The message has begun to penetrate the office environment. Enlightened organizations are showing signs of appreciating the need to provide for career progression for individuals, and for the transformation of the human organization as a whole over time. Information technology is a powerful stimulus to this process. Yet few organizations anywhere have learned that effective implementation of the new information and communications systems requires first of all a clear definition of management objectives for the human organization. This demands a powerful human resource planning capability which is rare in the personnel environment now, but will be forced to emerge as the decade advances.

Adopting and acting on the new perspective are particularly challenging in a government environment because of the strict hierarchical structure and the classification and hiring constraints which characterize a bureaucracy. Communications systems planners in the federal government should count on working with management to redeploy redundant skills and develop new skills. Creative use of the educational potential of the technology to support the learning and adjustment process should be emphasized.

## 2.6 Available and Emerging Technologies

The previous edition of the Annual Review forecast how information processing and management could evolve during the first half of the decade, given that technology develops at the rate generally predicted and is sensibly applied. Milestones were set at 1983 and 1986 on the basis that by 1983 a 32-bit microprocessor would be available at low cost and by 1986 a 64-bit processor would cost an original equipment manufacturer (OEM) two or three dollars.

A year later this forecast appears likely to hold true. Four U.S. semiconductor manufacturers announced 32-bit microprocessors in the spring, to become available starting in 1981. The Intel version is to cost about \$3,000 U.S. at this early stage and the National Semiconductor version considerably less. Once mass produced, the cost will drop.

These microprocessors are dubbed "micro mainframes" for good reason: they are expected to equal or surpass the processing power of the DEC PDP 11 and VAX 11/780 minicomputers and the IBM 370/158 mainframe. To the user this means increased communications and distributed processing capability, larger networks and affordable access to large data bases. Among the early applications of the 32-bit micros will be in large CBX (computerized branch exchange) switches. These require fast response time to monitor and react to user status but do not normally have enough users to warrant being powered by an IBM 370. Personal computers driven by 16 rather than 8-bit microprocessors are being introduced, and an eventual migration to the 32-bit processor can be expected.

Major computer manufacturers are bringing out 32-bit word "super" minicomputers which exceed the capabilities of mainframes available up til now. These machines provide a basis for digitized graphics, voice processing and multiple character sets at low cost. Some of these minis support gigabyte disk systems offering a useful storage capacity of 1.101 billion characters. Storage of documents on this type of disk is already cheaper than paper storage for almost any number of pages. Several departments are considering using this storage technology. Costs and benefits are reported in Section B.9 (Case Study in Financing Office Automation Development.)

Both mainframes and minicomputers will operate in a distributed manner. Within the distributed environment data base architectures are being offered which permit information to be managed and maintained uniformly throughout a network structure. Some of these architectures are compatible with the emerging OSI (Open Systems Interconnection) model, which will simplify international communications processing.



Continual progress is being made in the development of light-based communications capability using fibre optics and lasers. These technologies are being applied extensively in local area networks. Meanwhile satellites are coming into their own as the price of earth stations falls and their capacity to handle high traffic volumes increase.

Xerox has made a technical and commercial breakthrough by offering a highly sophisticated graphics capability merged with text and data processing on its Star system, announced in 1981. (See Section B.4.)

Now that speech can be digitized economically, the spoken word is beginning to be treated in much the same way as the written word in office communications systems; that is, it can be stored, edited and even directly entered into and retrieved from computer systems. Among the most interesting technical developments for communications systems planners must be speech recognition and voice response, because of their capacity to make systems friendly to the user. Both capabilities are already available off the shelf from a number of firms.

Voice response is being used for remote order entry, remote monitoring and readout, and information reporting. Speech recognition systems are still uncommon because the technology is much more challenging and as yet not as well developed, but those systems which are available are selling extremely well. Systems now available for \$3,000-\$6,000 without computer (\$20-25,000 with computer) recognize up to 200 unrelated words and in a few cases some short phrases, both directly and over a telephone line. Systems capable of recognizing continuous speech exist as yet only in the laboratory. By 1985 a single chip will be able to recognize 200-500 words from a reasonable range of speakers, and by 1990 the world market for speech recognition chips is expected to be \$3 billion. If this forecast is borne out, interaction with office equipment by means of a keyboard will be unnecessary for many applications by the end of the decade.



## 2.7 Government Research and Development

In 1978 the federal government established a policy objective of promoting a rise in the level of national expenditures on research and development to 1.5% of GNP. During 1980 a comprehensive review of federal research and development policies and programs was undertaken to define how the target could be achieved. The result was a research and development planning framework, announced in January 1981 by the Minister of State for Science and Technology as a stimulus to public discussion and strategic planning.

The R&D planning framework proposed that the target be achieved by 1985 through significant increases in expenditure by the federal and provincial governments and industry, with the federal share of the total dropping to one third by the target date. Real increases in expenditures of 8%, 9% and 17% were required of the federal and provincial governments and industry respectively to achieve the target. In 1980/81 this has meant a requirement for an increase in federal expenditure of some \$195 million over the previous year. Actual expenditures have surpassed the required amount.

Approximately one half of the increase in federal funding was to be allocated to support industrial research and development, one third to mission-oriented R&D (directly supporting departmental mandates) and one fifth to university research. The federal government will be acting in accordance with this strategy, but has indicated it could revise its commitment if complementary support is not provided by the other sectors.

The R&D planning framework confirmed that the government considers industrial research to be of particular importance in the areas of communications, space and electronics. During the 1980/81 fiscal year, the Department of Communications spent \$71.6 million on communications and space research and development. The 1981/82 expenditure is expected to be \$57.5 million, or 41% of the Department's total budget. The level of expenditure varies substantially from year to year because a significant portion is for large satellite development projects.

Communications research and development expenditures in other federal departments are estimated to be more than \$23 million in 1981/82, of which \$9.2 million will be accounted for by the Canadian International Development Agency, \$3.6 million by the National Research Council, \$3.2 million by the Natural Sciences and Engineering Research Council, \$3 million by National Defence, \$2.3 million by the Supply and Services Unsolicited Proposal Fund, and \$2.3 million by other departments. Space Program funding in other departments and agencies in 1981/82 will be \$25.3 million.

The 1980/81 total for communications and space of approximately \$100 million compares to gross federal expenditures on science and technology of \$1.69 billion in 1980/81. Some of the major programs to which these funds are allocated are described below. Detailed information on federal science expenditures is found in the annual MOSST report entitled "Federal Science Activities".

## 2.7.1 Department of Communications

2.7.1.1 Office Communications Systems Program - The OCS Program, a joint undertaking of DOC and Industry, Trade and Commerce, aims to help create a viable office communications products and services industry in Canada. The specific objective is to develop a comprehensive range of Canadian products and services capable of operating in an "open systems interconnection" (OSI) environment and of meeting real user needs. Among the target products and services are multifunctional workstations, voice/data switches, local area networks and network gateways and associated software.

The OCS Program is funded to the amount of \$2.5 million plus \$10 million approved in principal over the period 1981-1984. A major portion of these funds will be used to finance pilot projects in the federal government which could lead to functional specifications for equipment and services. A finite number of pilot projects will be supported by the Department, with contributions ranging from 10 to 90% of total project costs. The level of assistance will be prorated to the benefits to Canadian industry expected from each pilot.

There is evidence that a large number of departments wish to undertake pilot projects as soon as possible and that many are looking to the OCS Program for direction and support. The OCS Users Group has been organized to address the concern and assist in the effective delivery of the OCS Program. Dr. Peter Meyboom, Deputy Secretary of Treasury Board Canada, chairs the group and approximately 18 departments have become members. Additional memberships are available upon request to the OCS Program Office.

The OCS Program is also becoming involved in work to stimulate the development of a Canadian-based office automation industry capable of competing in the domestic and export markets. Industry development initiatives are coordinated by an Industry Consultative Committee chaired by Carl E. Beigie, President of the C.D. Howe Institute. The Industry Committee has 19 members representing the communications, software, services and equipment sub-sectors. Its role is to map out an industrial strategy and to assist in the effective delivery of the OCS Program.

The OCS Program Office has become a member of several research organizations such as the Diebold Automated Office Program and the Office Technology Research Group, both U.S. based. Limited participation in seminars organized by these institutions and use of their reports is open to interested departments through the Program Office. Inquiries on any aspect of the OCS Program may be directed to the Program Manager at 992-9316.

2.7.1.2 Fibre Optics - Federal government research in the field of fibre optics is carried out at the DOC Communications Research Centre, Shirley Bay. The emphasis at CRC is on studying the technical feasibility of fibre optics-based local area networks and developing key technology. Extensive research work is also being conducted in the private sector in Canada. A half dozen projects using the technology are under way or planned, the most ambitious being the linking of all communities in Saskatchewan with more than 500 inhabitants. The 3,200 kilometre facility, being installed by SASK TEL over the period 1980-84 at a cost of \$56 million, will provide the basis for a province-wide Broadband Network to deliver all forms of telecommunications services.

The technology is however still only viable where very large volumes of data or data requiring secure facilities are transmitted over short distances. In the latter case the transmission would still have to take place within a physically secure area to meet federal government security requirements.

2.7.1.3 Telidon - An increase in funding of \$27.5 million was approved by Cabinet in 1980/81 for Telidon. Most of these funds are being channelled to support development work in the private sector. This work includes reducing the cost of a TV converter from more than \$1,000 to \$150 in the next year, and producing an interface to the Apple II personal computer, allowing it to act as a Telidon terminal. Almost half of the funds - \$10.5 million - will be spent during 1981 and 1982 on the Industry Investment Stimulation Program to encourage public and private organizations to launch Telidon Services. At least 12,000 new terminals will be built, of which 2,000 are to be acquired by the Government of Ontario. Under the terms of the Program the federal government pays 50% of terminal production costs. In addition, some departments are investigating the potential of Telidon as a means of delivering service to the public across the country. (See Section B.5). This has become more feasible since the development in mid 1980 by Northern Telecom of the ability to transmit Telidon images over a packet data network.

With the announcement that AT&T has adopted videotex standards compatible with Telidon, commercial interest in Telidon has grown and DOC has announced its intention to transfer responsibility for funding its development to the private sector.



2.7.1.4 Space - The federal government Space Program is administered by the Ministry of State for Science and Technology, but the Department of Communications is the focal point for space research and development relating to communications. DOC is a major sponsor of satellite development through in-house work at the Communications Research Centre, Shirley Bay, and contracts with the private sector. Total government expenditures on space were \$70.135 million in 1980/81, of which \$33.293 million were accounted for by DOC. The current five-year (1981/82 to 1985/86) plan for space research and development, approved by Cabinet in the spring, calls for new expenditures of \$196 million (\$28 million in 1981/82), of which approximately 40% is communications related and therefore administered by DOC.

Satellite services planned and available in Canada now are described here, first in general terms, then with specific reference to implications for government telecommunications planning. Present and planned Anik satellites provide fixed services; the Mobile Satellite (MSAT) Program is intended to provide communications to terminals in motion; and the Direct Broadcast Satellite (DBS) Program would provide a variety of broadcasting services to individual home and community receivers. The emphasis here is on future services. Note that communications satellite systems in Canada are complementary to terrestrial systems, their unique capabilities (distance insensitive, flexible, high volume transmission capacity) making them more economical in certain application areas.

#### 2.7.1.4.1 Fixed Services

For the foreseeable future most satellite voice, data and video transmission services will continue to be provided by fixed satellites. Service in the two major frequency bands is examined here.

##### 6/4 Ghz Service

The 6/4 Ghz Anik A satellite system operated by Telesat Canada provides heavy route voice and data services in southern Canada, medium route voice and data services to three locations in northern Canada, thin route voice and/or data services to northern Canada, and TV and radio distribution to numerous locations throughout Canada. Approximately 130 6/4 Ghz fixed earth terminals and 12 transportable terminals are in use. Telesat has contracted for an additional 12 transportable terminals as well as three thin route TDMA (Time Division Multiple Access) terminals to demonstrate satellite business services to industries with centralized control. The 6/4 Ghz payload on the Anik B satellite supplements the Anik A system, providing telephone and CBC network distribution services. The Anik D satellite system now in production will replace the Anik A system. The first of two Anik D satellites is to be launched in August 1982.

### 14/12 Ghz Service

Since terrestrial systems do not normally operate in this frequency band, terminals for satellite communications at 12/14 Ghz can be located anywhere with negligible interference problems. Other features of the Anik B and future Anik C systems which operate in this band provide significant advantages. Both systems use wide-bandwidth transponders (72 Mhz and 54 Mhz respectively) which can accommodate two video channels. Both have four foot-prints covering Canada in the downlink bands, thereby conserving use of the spectrum and providing greater power flux density to receive terminals. These features permit terminals with smaller antennas to be installed on rooftops, thereby providing the interurban digital transmission capacity used by computers which is important for business services. High transmission rates (91 Mbs for Anik C) can be used by the telephone carriers for trunked communications, low cost telephony terminals can be used to provide voice and data communications to business and communities in remote areas, and low cost TV receive only (TVRO) terminals can be used for TV delivery to remote communities and individual homes.

DOC has leased the 14/12 Ghz capacity on Anik B and organized pilot projects to demonstrate some of these services. Phase 2 of the Anik B pilot program came into effect in February 1981 and will continue until September 1982. At that point the launch of the first of the three Anik C satellites by the U.S. Space Shuttle is planned and some pilot projects will become operational services.

Included in the Anik B projects are CNCP trials and demonstrations of slim-route (3.0 Mbs) TDMA services aimed at the business market. The terminals used in these trials have been developed by Miller Communications under a joint DOC/CNCP contract. The Government Telecommunications Agency is using the DOC/CNCP slim-route TDMA network with Low Cost Telephony Terminals (LCTTs) as feeder links to evaluate satellite/terrestrial tradeoffs for government communications (see Section B.7).

The LCTTs are being developed by SPAR Aerospace and SED of Saskatoon under DOC contracts for use in business and remote service applications in Canada and for the export market. Television services are being provided to numerous communities and individual homes using TVROs developed by SED for DOC. Anik C terminals developed by Raytheon Canada under a Telesat contract are being used by Telesat/TCTS for trials of trunk communications at 91 Mbs between Toronto and Montreal. DOC support for the development of LCTTs, slim-route TDMA terminals and TVROs should enable Canadian industry to produce low cost terminals and in turn permit economical services to be provided.



## Future Services

A service which could cause substantial growth in satellite use is video teleconferencing, which requires the high bandwidth satellites provide. Rising energy costs are encouraging the expectation that this could become the most widely used satellite service. Studies conducted in the United States indicate that widespread use of video teleconferencing could greatly increase satellite traffic. DOC has begun an in-house study of future requirements for fixed satellite services, and video teleconferencing will be a major topic.

Given the projected growth for fixed satellite services, spectrum/orbit capacity will become a scarce commodity. Various technological means are being pursued to alleviate this problem. These include reduction of sidelobes to permit closer spacing of satellites, the use of cross-polarization to double capacity, the use of spot beams to allow for frequency re-use, the use of on-board-switching between spot beams, and the use of digital techniques which increase traffic handling capacity. Furthermore, high capacity of 30/20 Ghz systems now being developed are expected to be implemented in some countries during the 1990's. Large multipurpose space platforms are also being investigated. These would allow for numerous channels on a single bus with inter-satellite links. The DOC Communications Research Centre is involved in this type of research and development.

### 2.7.1.4.2 Mobile Satellite Services

A Mobile Satellite (MSAT) Program has been approved and \$2.2 million allocated for system definition studies. Plans call for an MSAT system to provide services at 240-400 Mhz, 401-403 Mhz, 406-406.1 Mhz, 806-890 Mhz, 1.5/1.6 Ghz, and 7/8 Ghz. The 240-400 Mhz and 7/8 Ghz would be DND payloads (channels) and would provide an operational service on the first satellite launched. The 806-890 Mhz service would be used for demonstration/trial purposes, and as an interim operational service until a dedicated 806-890 Mhz system could be implemented.

The DND 240-400 Mhz payload would provide secure tactical communications to manpack and land-mobile terminals, shipborne and airborne terminals. The 7/8 Ghz payload would provide secure strategic communications to fixed and transportable terminals. Inclusion of a 20/44 Ghz payload for military trials and demonstrations is also being considered.

The 401-403 Mhz payload would provide a communications link to remote data collection platforms used by government departments and resource industries. The 406-406.1 Mhz payload would provide an emergency beacon monitoring service for Search and Rescue authorities to receive immediate notice of incidents of distress. These two payloads could be provided very economically by extending the 240-400 Mhz transponder. The 1.5/1.6 Ghz payload would provide INMARSAT compatible Maritime Mobile Service to Canadian Arctic waters which may not be covered by INMARSAT. Users would be government, the shipping industry and resource industries.

The public mobile satellite service (806-890 Mhz) would permit extension of mobile communications to rural and remote areas for operation with land-mobile, shipborne, airborne, transportable, field portable and personal portable terminals. The main application areas foreseen for the mobile service are:

#### Private Radio Service

(i) used by the federal government for law enforcement, Coast Guard services, fisheries management, resource management, emergency disaster services and emergency health services.

(ii) used by provincial governments for law enforcement, ambulance services, forest protection, resource management and highway services.

(iii) used by resource industries, public utilities, transportation companies, communications carriers and so forth.

#### Mobile Telephone Service (MTS)

The MTS would be used mainly by professionals, salespeople, and any of the agencies mentioned above who have a specific requirement to interconnect with the switched network or to be interoperable with the terrestrial MTS system.

Numerous studies are under way to define market requirements for MSAT, potential institutional problems, direct and indirect economic benefits and technological development required before a system could be implemented. The result of these Phase A studies will be submitted to Cabinet in April 1982 for a decision on development of such a system.

#### 2.7.1.4.3 Broadcasting Satellite Services

A program to study the implementation of a Direct Broadcasting Satellite System in Canada (DBS) has been approved, and \$1.5 million has been allocated for feasibility studies in the following areas:

- Television service availability in rural and remote areas;
- Rural demand survey;
- Requirements for non-TV services for delivery via a DBS;
- Use of ANIK C for interim DBS services;
- Impact of a DBS on the broadcasting industry;
- Potential impact of DBS developments abroad;
- Economic feasibility of DBS programming;
- Regulatory implications of a DBS system;
- Economic analysis of system alternatives;
- System engineering modelling - Phases 1 and 2;
- System economics analysis;
- Options for institutional arrangements;
- DBS penetration into urban markets;
- Supporting technical studies;
- comprehensive report consolidating study results.

When these studies are complete, a decision will be made on the viability of developing a Canadian DBS System. Meanwhile, a contract has been let to Telesat to study the viability of Anik C as an interim DBS System. If the market warrants this approach, and if it is institutionally feasible to do so, this would be an important step toward the development of a dedicated DBS system that could provide equal TV services to all Canadians economically.

#### 2.7.1.4.4 Implications for Government Telecommunications Planning

Satellite services will be widely used in this decade for business communications, whether purchased from the common carriers or directly from Telesat. The Anik B trials to be conducted by GTA with CNCP and TCTS and the participation of certain departments are expected to be the first step towards satellite business services, including automated office communications, for government departments. (See section B.7). The Anik B TVRO trials are of interest to government departments involved in education, health and welfare, and the provision of social services. A future service for which government departments could have extensive use is video teleconferencing. All of these services could become operational with the implementation of Anik C in late 1982.

All channels on the Mobile Satellite would provide communications services to government departments. Departments which have indicated a need for these services are the Atmospheric Environment Service; Defence; Energy, Mines and Resources; Fisheries and Oceans; Health and Welfare and Transport.

2.7.1.5 University Research Program - Department of Communications funding for university research in communications was \$800,000 in 1980/81. Projects were funded in the categories of systems and networks, engineering and technology, and socio-economic impact. Complementary funding of \$350,000 was provided to the universities under the federal Centres of Excellence Program.

Under the heading of systems and networks, studies were conducted to contribute to the development of Canadian standards for high level OSI protocols and to clarify issues relating to the use of packet radio for mobile and fixed communications. Engineering and technology projects included the analysis and design of a mobile data communications terminal. Employment implications of computers and telecommunications technology were investigated in the socio-economic category, and a directory of data bases in Canada classified according to type, ownership, control and access was produced. Reports are available from DOC on some of these and other sponsored projects.

The Government Telecommunications Agency commissions research from universities across Canada for application to service development. The six research contracts described briefly below were completed in 1980/81. A limited number of copies of these reports is available.

1. Study of New Services on Integrated Computer Telecommunications Networks (Laval University) -

This project completed earlier work on the adequacy of current networks to meet demands for new services such as videotex and trade transaction processing.

2. Methodology for Integrated Network Design (University of Toronto) -

Four problems important in the design of integrated networks were studied, namely capacity assignment, buffer management, flow control and routing.

A general method for capacity assignment and simpler techniques applicable in special traffic conditions were developed. Some buffer management schemes were analyzed and the application of queueing theory to buffer management was demonstrated. A queueing analysis of a simple flow control scheme was provided and routing algorithms examined.

3. Study of Telecommunications Delivery Systems in Support of the Freedom of Information Act and Service to the Public (Carleton University) -

A number of candidate delivery systems were evaluated with respect to technical and practical feasibility, sensitivity and estimated capital and operating costs.

4. Teleconferencing as a Viable Communications Alternative: An Economic and Statistical Analysis (Technical University of Nova Scotia) -

National trends in audio and video teleconferencing are examined along with available Canadian equipment. A limited assessment of the economic potential of teleconferencing is provided as well as a model for an in-depth study of future trends in usage and equipment requirements.

5. Development of Criteria for Selection of Terminal Equipment in an Interconnect Environment (University of Windsor) -

A mathematical methodology is provided to assist the government in defining cost-effective means of meeting its telecommunications needs in an interconnect environment.



### 2.7.2 National Research Council

NRC has succeeded in combining the capabilities of NATAL, its course authoring computer language, and Telidon Picture Description Instructions (PDIs). This makes it possible to include graphics in computer-taught courses programmed in NATAL while overcoming the limitations on interaction characteristic of Telidon. The merger of the technologies has therefore enhanced the capability of both and produced a powerful teaching tool.

Further benefits include the following:

- The full Telidon capability becomes available on any graphics terminal, and the alphanumeric capability (i.e. the ability to retrieve and display text) becomes available on any computer terminal. The terminal is identified to the system by its control codes. This has the potential to reduce equipment costs significantly and expedite acceptance of Telidon, since existing terminal equipment could be used.
- There is no need for special "information provider" terminals. The user's terminal can serve the same purpose.
- The user can generate and store his/her own data by interacting with the system, rather than simply recall information stored by an "information provider".
- Higher picture resolution is possible than with Telidon PDI's alone.
- Information access becomes much simpler and more flexible on Telidon with the addition of the sophisticated computer aided learning (CAL) software.

The NATAL software has been transferred to Honeywell Ltd.

The Council also funds research in the private sector. For example, HiTech Canada Ltd. of Ottawa is completing development of a sophisticated OCR capability under an NRC grant. The device is able to read three different fonts simultaneously and "learns" to recognize practically any font in less than 20 minutes by following a standard teaching algorithm.

## 2.8 Standards

### 2.8.1 Introduction

The mandate of the Government EDP Standards Committee (GESC) is to produce new federal government standards only when no national or international standards can be adopted to meet a federal requirement. Working groups of the Committee establish and express the consensus of federal departments in the national standards process and in briefings of national delegations to the international process.

The convergence of data processing and telecommunications technology, foreseen by the Computer/Communications Task Force at the beginning of the 1970's, led to the extension of the GESC to cover related telecommunications matters by the formation of an inter-departmental GESC/Data Communications Working Group. New equipment and systems such as Telidon, fibre optics, digital telephony using computer-controlled time division exchanges and other new digital networks have since led to the formation of GESC/DCWG sub-groups on Telecommunications Performance, Open Systems Interconnection, Fibre Optics Technology, Automation of Information Preparation and Interchange, and even data communications security. Experts in the different technologies attend these Special Interest Groups.

The role of the DCWG has evolved into coordination of telecommunications aspects of the whole field of information technology standardization for federal departmental use. The Government Telecommunications Agency plays an active role in GESC and its Special Interest Groups involving telecommunications. GTA specialists also take part in pertinent studies in telegraphy, telephony and data transmission in the CCITT, and related work in ISO. This work is carried out in active consultation with interested departments of the federal government and with representatives of operating organizations.

### 2.8.2 Special Interest Groups

A number of Special Interest Groups (SIGs) on telecommunications matters operate under the interdepartmental consultative arrangements of GESC and Treasury Board guidelines. The first of these was convened by GTA at the request of a number of departments to develop a federal standard on performance criteria for data circuits. The draft federal standard on performance is being used on a trial basis for one year with the status of an approved guideline. Liaison with industry was effective and several user departments also participated in the drafting stage. Further studies are under way in conjunction with similar initiatives at the U.S. National Bureau of Standards and National Communications Agency.

This SIG is now extending its scope to cover all the work of the Canadian Standards Association Technical Committee on Data Communications (CSA/DC) which is the authorized national standards-writing committee participating in the international standards studies in ISO/TC97/SC6. CSA/DC has already prepared several national standards based upon CCITT as well as ISO standards. The SIG is examining these for application in the federal government.

This Group could develop other telecommunications standards under the same GTA convenorship for reference in user department specifications if the need is expressed.

### 2.8.3 Open Systems Interconnection

The work of another national standards group, the Canadian Standards Association "CSA/Open Systems Interconnection", is closely followed by GESC/SIG/OSI. The federal group participates in the Canadian delegation to ISO/TC97/SC16 on Open Systems Interconnection, which is headed by a representative of the Canadian Bankers Association. Federal department experts have been included in some delegations to meetings abroad and also in consultation with the Departments of Industry of France and the United Kingdom. Contacts have been established with the United Kingdom Computer and Telecommunications Agency, the United States National Bureau of Standards and the Australian Telecom R&D Laboratories. The GESC/SIG/OSI convenor is supplied by the Department of Supply and Services.

### 2.8.4 Fibre Optics

The GESC/SIG/Fibre Optics is a well established forum for experts in this new technology, which is already being applied to federal government communications requirements. In this field there is as yet no CSA Technical Committee. Related activity is in the CCITT as well as in the International Electro Technical Commission (IEC) through the Standards Council of Canada and in EIA.

### 2.9.5 Information Preparation and Interchange

The most recently formed GESC Special Interest Group is "Automation of Information Preparation and Interchange". It covers teletext and facsimile equipment technology. Like the others, it consolidates and expresses federal government views in national preparatory committees. Its scope is similar to that of a newly authorized ISO technical committee (ISO/TC97/SC18) "Text Preparation and Interchange". One of its working parties is convened by a representative of the Canadian manufacturing industry.

The inaugural international meeting was hosted by the Standards Council of Canada (SCC) in Ottawa at the end of August 1981. The corresponding national standards-writing authority is the CSA "Technical Committee on Videotex and Telematics". The Special Interest Group is convened by a member of the DOC R&D Sector. The CSA group is convened by a representative of TV Ontario. A related government-industry consultative committee on videotex standards principles is convened by a representative of the DOC Policy Branch.

#### 2.8.6 Terminal Attachment

Since 1976 the Department of Communications has sponsored consultations on standards for the connection of customer-owned terminals to the networks of federally regulated telecommunications operating organizations. The first phase involved network non-addressing devices (those not capable of dialling into the telephone network), and the second phase standards for network addressing devices such as telephones, key telephone systems and PBXs.

The Terminal Attachment Program Advisory Committee (TAPAC), comprised of representatives of operating organizations, manufacturers, users and participating provinces, aims to produce terminal attachment specification standards suitable for adoption by regulatory bodies. Recognized national standards can be referred to by federal departments in specifications for the supply of equipment and services. The mid 1980 CRTC interim decision on Terminal Attachment adopting American attachment standards brought into sharp focus the need to develop better recognized Canadian standards and to promote a uniform environment for customer-owned equipment for voice, text and data processing equipment interfacing with the lines and networks of Canadian regulated operating organizations.

Standards and certification procedures recommended by TAPAC for network non-addressing devices such as auto answering machines, modems and hands free loudspeaking telephones are available through GTA for reference by federal departments. TAPAC network interface standards for network addressing devices are now available for single line devices, key telephone systems and PBXs.

The amended CRTC interim decision on attachments to the Bell Canada and BC Tel networks requires that equipment be of a type provided by Bell or meet TAPAC or U.S. Federal Communications Commission (FCC) standards. The CRTC hearing on the subject of terminal attachment was held in November - December 1981 and a final decision is expected in 1982.

## 2.9 Summary

From the above analysis and the following sections on carrier and supplier plans it will be evident that the environment is rapidly becoming conducive to the establishment of innovative communications systems. To take advantage of the new opportunities a longer range planning perspective is required, along with a commitment to collaboration between representatives of a broad spectrum of expertise. How to do this is addressed in Section B.8.



### 3. Survey of Transmission Facility Suppliers

As more information is captured and generated electronically, the need grows for high speed, high capacity, versatile, low cost communications services. Digital transmission facilities make it physically possible to develop such services, and a regulatory environment increasingly favourable to competition makes them commercially feasible. Thus the market traditionally served by two common carriers (CNCP and TCTS) has the potential to open up to new suppliers of transmission facilities and new services.

Traditional communications services, which do not offer the above advantages, are losing their appeal. This is particularly true for transmissions involving large volumes of information and/or long distance. On the basis of escalating cost alone the telephone is becoming impractical for many business communications needs, while the amount of data communications capacity purchased per dollar is increasing steadily. Furthermore, the conversion of the telephone network from analog to digital is not expected to bring the cost of voice communications into line with that of data.

The non expert needs an ordering scheme to understand what is happening in this market. One approach to comprehending new services is to group them as 1) based on new transmission media, 2) enhanced or value added, and 3) local area networks (LANs). The new suppliers of business communications services are computer and office equipment manufacturers, digital switch (PBX, CBX) manufacturers, telecommunications equipment manufacturers and cable companies. These developments are examined here briefly.

New Transmission Media - Broadband media, in particular cable and satellite, are coming into their own for business traffic because of their high capacity and speed.

Both CNCP Telecommunications and the telephone companies are experimenting with satellite services. Section B.2.7 of this Review related that CNCP has established a trial network in Ontario and is jointly sponsoring with GTA a pilot test of the Anik B satellite for a variety of types of business traffic. In June, the TCTS Computer Communications Group announced plans for a satellite trial on Anik B starting in June 1982 with the cooperation of Telesat (a TCTS member) and the Bank of Nova Scotia as user. This is to be the first step towards the establishment in 1983 of an Integrated Satellite Business Network (ISBN) providing transmission facilities to medium and large sized organizations for all types of business communications in Canada and abroad. A government trial of this service has been arranged by GTA for 1982 (see Section B.7). Note that as a result of CRTC Decision 81-13, as varied by the Governor in Council, whole and partial satellite channels will be available from the regulated common carriers at tariffed rates.

Meanwhile, Bell Canada is considering the introduction of a digital multiplexed switching (DMS) service in the Ottawa/Hull area in 1983 to replace the outmoded step-by-step system used by the federal government since 1960. The current service does not provide sufficient flexibility to meet present and future government communications requirements and does not permit usage data to be collected in enough detail for cost allocation purposes.

Bell Canada is also considering a DMS expanded centrex (DEX) service to accommodate these needs based on the new features and services available from the DMS technology. Initially, DEX service would offer an impressive list of local network and management features. As DEX service evolves it could offer increasingly sophisticated network and management tools to improve control and hence efficiency. The Agency is evaluating the viability and suitability of the proposed service. Departments should bear this in mind when contemplating the acquisition of PBXs.

Value Added Services - These provide more than simple transmission of information from source to destination. Value added services are offered by the common carriers and by firms which lease lines from the carriers, add service enhancements, then release or sell the package to the customer. In some cases, the service is acquired independent of the lines. This kind of service has been available in the United States for some time, but is just emerging in Canada.

Concern has been expressed by some interest groups that the common carriers have unfair advantage in this market, given their access to lines at cost. The CRTC has undertaken to schedule a major policy hearing on the subject within the next year, but as mentioned previously, it is unlikely that a decision would be released until late 1983. Meanwhile, it has ordered Bell Canada to make lines available to companies proposing services similar to its Call Relay message forwarding service now being tested in the Hamilton area. Call Relay will allow users to leave messages with the operator for delivery when the receiving telephone is answered. Voice Message Service, a division of Shell Canada, now offers a fully automated store and forward service more suited to business communications because of its broadcast capability and confidentiality.

Both Bell Canada's Envoy 100 and CNCP's Infotex offer what is essentially an electronic mail service in which the capabilities of the terminal equipment are augmented by intelligence in the network. Thus any dumb, asynchronous terminal connected to Envoy 100 can provide access to mail management services and to all other terminals on the network, as is the case with telex and TWX, and can be used for purposes other than communications such as data processing. Similarly, Infotex permits communications among major makes of incompatible word processors and between word processors and telex machines. The current alternatives to Infotex for communication between word processors are a translation software package or a protocol conversion device.

Tariffs had yet to be approved for either service at the time of writing. (See Section B.2.3 - Regulatory Influences). Both will include a usage charge which is volume, but not time and distance sensitive. This means that connect time will be free of charge and that a given message can be sent anywhere in the country for the same price - a significant departure from pricing practices for telex/TWX and telephone. Accurate accounting for the cost of using these services requires that terminal and communications hardware costs be taken into consideration. This could be difficult, since terminals are not dedicated to communications. Cost estimates should also account for employee time saved and/or added by using the service instead of the telephone for routine communications. Costs will be easier to identify for Infotex, since it will link only word processors and telex machines and handle only text transmissions.

Another enhanced service was announced by the TCTS Computer Communications Group in May 1981 for a trial starting July 1982. Called iNET, for "intelligent network", this service would permit both alphanumeric and Telidon-type alphageometric terminals to access multiple data bases easily. The target user is the executive, manager and professional. The National Library and possibly other federal agencies will be participating in the trial.

Ultimately, low cost multifunctional terminals will incorporate the type of intelligence now being built into the common carrier networks, with the result that the user will be able to choose to have direct control over functions now provided as part of these enhanced services.

Local Area Networks (LANs) - A major feature of the communications industry during the past year has been the rapid development of local area networks. These provide electronic support for the estimated 81% of business communications which take place within, rather than between, office buildings and complexes. Until recently, this huge potential market has been served only by the telephone network, with the result that text messages often take days to be delivered from one floor to another.

Local area networks normally span a maximum of one or two kilometres and connect to the public switched networks through "gateways" for longer haul communications. The transmission medium can be coaxial cable, twisted wire pair, optical fibre, laser or microwave, the first two now being the most common. One U.S. company offers LocalNet, which can run on existing CATV cables. Key design objectives are capacity, reliability and flexibility. Transmission speeds are high (up to 20 Mbps) and costs much lower than for leased data circuits at \$2-3.00 per port (terminal link-up). Installation and maintenance are normally easier and cheaper than for conventional wiring, and less space is needed. These features make LANs the logical backbone for communications between office devices, other transaction processing terminals and personal computers.

Local area networks are distinguished from both the value added services being developed by the common carriers and the computer network architectures being developed by equipment vendors to integrate their products. Thus IBM's attempt to develop full communications compatibility among all its computer products under the Systems Network Architecture (SNA) umbrella is part of preparing to compete for essentially the same market as the Xerox Ethernet, a cable-based LAN. IBM is also expected to announce a local network by the year end. Services such as Envoy and Infotex are aimed at the text communications portion of the local communications market.

Manufacturers of digital switches are also key contenders for the local communications market. Mitel and Northern Telecom in Canada, InteCom and Rolm in the United States, to name the major contenders, offer PBXs (private branch exchange) and CBXs (computerized branch exchange) which permit twisted wire pairs to be used for both voice and data transmission. Thus the exchange evolves from voice communications hub to integrated office communications controller. This approach will be popular, judging by the rapid expansion of PBX/CBX installations and the fact that twisted pairs already exist in office buildings to support telephone service.



Some word processing vendors are offering or planning to offer LANs, notably A.B. Dick, TRW Data Systems and Wang. The Wangnet supports multimedia communications, including voice, data and video, and other vendors' equipment. There are signs that a trend to local networks with the latter capability may be emerging. Local networks are also becoming available specifically for microcomputers such as the Apple (eg. Zilog Z-Net). On the other hand, telecommunications equipment manufacturers such as Mitel, Northern Telecom and Rolm are moving aggressively into the office automation equipment market.



#### 4. Survey of Equipment Suppliers

Some progress has been made during the past year in bringing to the market office communications products which meet real user needs, but in general it is still the manufacturer who decides what will be offered. Inadequate consultation with users has resulted in uninspired systems which frustrate, rather than facilitate, office work. Office automation products will continue to fall short of the ideal for another few years, until the user community has enough practical experience in analyzing office work to specify in detail what it wants.

Speeding up the learning process for both user and vendor is the intent of the federal Office Communications Systems (OCS) Program. Product functional specifications are to be developed on the basis of the results of field trials partly sponsored by the Program, then passed on to the Canadian electronics industry for product development.

The majority of the new office automation products are of U.S. origin, and many are not yet available in Canada. Some notable exceptions have emerged in the last year, most to support specific applications. The Northern Telecom Displayphone is probably the best known of these. This prototype "intelligent telephone" provides direct access to both voice and data circuits and features a screen for display of messages and data. Market trials began in 1981 and include the Government Telecommunications Agency. Mitel Corporation will announce its SX-2000 Superswitch, which will handle 1,100 to 1,200 extensions, and a range of compatible telephone terminals this fall. Like the Displayphone, the Mitel terminals will have video display and both voice and data processing capabilities. Mitel has made it clear that it intends to move into the integrated office terminal market.

Nanotec has developed a teletype replacement which stores up to 50,000 characters and eliminates the need for paper tape, but at \$3,000 costs only 1/7th as much as a high priced teletype unit.

HiTech has developed an OCR (optical character recognition) device which could have application in digitizing federal government files for access under Freedom of Information legislation. The device reads a page in 11 to 17 seconds - more than 10 times faster than competing products - regardless of quality and colour of the page. It is unique in reading both English and French characters and a wide range of fonts. It is easy to use, competitively priced and interfaces to a wide variety of equipment, including telex and word processors.

Departments interested in video conferencing may want to investigate the Audisee portable system from Kelcee Communications, which transmits high resolution (better than TV quality) images over any good telephone line in 75 seconds and stores them on ordinary audio cassettes. Any frozen image which can be recorded by a television camera can be transmitted, including Xrays, graphics and photographs. The compelling features of this product are that it permits a video quality image to be transmitted over telephone lines in less time than most facsimile machines need to produce a vastly inferior image, then stores the image very cheaply. Hard copy is however not yet available.

Nabu Manufacturing, an Ottawa consortium established in 1981, is developing a home computer to interface with the cable television network and has acquired a Canadian chain of retail outlets for business and home computers.

The true low-cost multifunctional terminal, or workstation, is still several years away. It is expected to be based on a cheap 32-bit "micro mainframe", of which versions were announced almost simultaneously this spring by four U.S. semiconductor manufacturers. Terminals of this kind will introduce advanced information systems of vastly enhanced capability starting in the latter part of the decade. The foundation will be laid during the period to 1985 by the expansion of functional capability, increased integration of technologies and systems and the acceptance of the personal computer as legitimate office equipment. These trends are quickly gaining momentum, and are examined briefly here.

Expanding functionality - In general the trend has been to offer more power and functional capability for the same price, but at the low end of the market prices are being cut while versatility increases. Products aimed at the "knowledge worker" are beginning to appear now that both vendors and users have absorbed the fact that the real payoff potential lies in this market. The Xerox Star system is the first major product of this type to be announced. Scheduled for delivery starting in 1981 at \$16,500 U.S., the Star is geared to the professional who lacks DP orientation and keyboard dexterity. Standard capabilities include text and data processing, graphics, electronic mail, "help" routines and hard copy, while options provide records management, math, advanced graphics and foreign languages, amongst others. The merger of alphanumeric and graphic capabilities on one terminal is a major breakthrough. The Star is expected to be announced in Canada in December 1981.

Increasing Integration - The integration of office systems into networks is becoming more feasible now that manufacturers are integrating their own product lines and recognizing the immense potential of the communications market. For example, the Star system is closely tied to Ethernet, the Xerox local area network, from which the real profits are expected.

The prospects for electronic messaging alone are extremely attractive, judging from the fact that 70% of U.S. first class mail is generated by computer and most is destined for eventual entry into another computer system. Virtually all internal correspondence is likely to be delivered electronically in time, and major corporations are already using electronic mail extensively in house. By 1985 financial imperatives will make it pervasive.

The cost of transmitting some classes of messages electronically is already competitive with that of postage, but incompatibility between office systems, lack of authentication and security provisions and other factors have limited the use of this alternative. Unfortunately for the user, vendors are locking their customers in by employing incompatible communications protocols, codes and character sets. The emergence of standards, although certain for the longer term, does not appear imminent. A number of hardware suppliers and software houses are leaping into the breach. The latter provide translation packages for word processors, and CNCP's Infotex will provide the same type of service.

A promising sign is the recent Radio Shack announcement of software which will permit its TRS-80 Model II personal computer to communicate with IBM 360/370 mainframe computers, non IBM devices compatible with this series, and DEC PDP-11 and VAX-11 minicomputers. The software enables this home computer to provide fully interactive access to IBM remote programs and to function as a remote job entry terminal.

Use of Personal Computers in Business - During the past year the personal computer (so called because it is sufficiently inexpensive to be owned and used by one person) has made substantial inroads into the business market. Already in 1980 purchases of these products for the office were approaching those for the home (\$90 million and \$120 million respectively in the U.S.), and purchases by small businesses had outstripped both at \$590 million in the United States. Total U.S. sales are expected to double to \$1.5 billion in 1981. By 1985 the value of purchases for the home and for small business are each expected to quadruple while the size of the office market expands tenfold.

In unit terms, one million personal computers are now installed in the United States, the major market, and a compound growth rate of 40% is expected to raise this figure to 10 million by 1985. One major manufacturer expects to produce a million personal computers in 1981 alone - the equivalent of the total number of computers of all types installed worldwide prior to 1980.

Particular optimism for the office market is justified on the grounds that major computer manufacturers are preparing to integrate personal computers into their regular product lines, thereby making it possible for them to function as intelligent terminals in existing information systems. As noted above, Tandy Corporation is positioning itself to compete for the same business from the low end by rendering one of its models compatible with certain mainframes.

The move in this direction by major computer manufacturers includes IBM, with its newly announced Personal Computer. This is one of the first of a new generation of small machines powered by 16-bit microprocessors, which increase processing capability dramatically over that of the first generation 8-bit machines. Much of this extra power will be applied to making the user interface more friendly. The entry of IBM into the market is expected to legitimize the use of personal computers in the office and provide keen competition for the established manufacturers, who started by supplying machines for the home. Japanese products are expected to be launched in the North American market in the next year or so and to bring prices down substantially. All of these products will be sold through retail outlets, with a potential major effect on equipment acquisition policy.

Many new entries into the office systems market can be expected, only some of which will survive. Rapid expansion of choice and the uncertain future of new products make it difficult to plan acquisitions with assurance. The range of choice is now also a key factor in decisions on communications devices such as PBXs which attach to the telephone network.

These circumstances call for a commitment to longer range planning. The sensible approach is to recognize that what is available now is a fraction of what will be available in a few years, and to meet existing needs with products which can be integrated into a comprehensive office communications system over time.



## 5. Survey of Information Providers

The market for access to public and commercial on-line data bases is expanding rapidly, and numerous directories of national and international scope are now being published. A 1981 study for the Department of Communications has produced an automated directory of those data bases located in Canada whose contents are stored on-line or in computer readable form and are available for access by the public. All types of subject are included, with an emphasis on government, legal, professional and academic information. The directory will be maintained up to date.

This study was commissioned as a basis for social policy development, with particular reference to videotex services. It found the information market place in Canada unorganized. Information providers range from libraries, universities and governments to service bureaux, media corporations and ad hoc commercial enterprises. Each operates within a context peculiar to itself and has its own particular contractual arrangements with its clients. There is as yet no universal means of accessing these separately operated data bases, although some can be addressed by the same routine. The iNET (intelligent network) service proposed by TCTS is intended to provide this type of transparent access. Such services are better developed in the United States, where they have been established in response to the proliferation of personal computers capable of accessing distributed data bases.

The study found on-line Canadian information content weak, and attributed this to the fact that most of the funds so far allocated to developing automated facilities for public access to information have been spent on hardware. It recommended that steps be taken to stimulate a variety of interest groups to gather and organize information for remote access. This was considered an urgent need, given that the work is labour intensive and likely to be lost to U.S. entrepreneurs unless action is taken soon.

The federal government confirmed its commitment to providing easier access to public information when Cabinet extended the mandate of the Task Force on Service to the Public and approved nationwide toll-free access to some 25 high volume federal services in late 1980. Fourteen departments are involved in the toll-free program. Walk-in centres will be established in 15 cities by December 1981 under the auspices of the Task Force. With the collaboration of the Department of Communications, 100 unmanned Telidon terminals are being installed across the country to provide public access to information on federal programs and services. This is a pilot project in which the terminals are initially linked to a central data base in Ottawa by customized circuits managed by the Government Telecommunications Agency.



Organizing federal government information for automated access on more than a pilot basis is a massive task which must be tackled to cope with the effect of proposed freedom of information legislation. The Treasury Board Canada task force dealing with this subject has found departments unprepared to meet the expected public demand.

## 6. Analysis of Departmental Plans

The basis for this analysis is information submitted to Treasury Board Canada by 59 departments and agencies in the Annual Telecommunications Report and Plan for 1980/81. Expenditure data for 1980/81 are analyzed separately in Appendix 1, and a detailed analysis of reported plans is contained in Appendix 2. The remarks made here outline the response to questions concerning plans.

The quality of plans submitted by certain major departments is much superior to that of plans submitted in previous years, but it cannot be said that there has been a general improvement in quality over last year. Substantial plans (those showing evidence of serious effort and an understanding of the issues) were submitted this year by only 14 organizations (23%) compared to 37% last year. Nominal responses were received from 10 organizations (17%), about the same as previously, but 32 (54%) did not complete the Plans section of the report and three departments did not submit the Report and Plan at all. Only 14% of respondents met the June 30 deadline, and none of these submitted plans. Clearly departments and agencies have had difficulty meeting the reporting requirements.

On the other hand, there appears to be greater awareness of the issues at senior and middle management levels. Fewer respondents than previously expected no change in their communications systems over the five year period, and a number reported that telecommunications management was being or had just been reviewed extensively. The impetus seems to come from the need to cut costs and the opportunity to do so provided by new types of equipment and services. The most sought after equipment appears to be the PBX/PABX/EPABX switch, on the basis of plans reported.

Departments were asked to forecast their telecommunications expenditures and person year requirements over five years. The aggregate of these forecasts shows telecommunications expenditures excluding salaries rising in 1982/83 and 1983/84 at about the same rate as that predicted by regression analysis, but at a substantially lower rate in 1981/82 and the last two years of the period. At this point it is not possible to discount either result, although the regression produces a result more in line with current inflationary trends. The aggregate forecast based on departmental estimates will be a useful point of reference next year and thereafter, and should become more reliable as departmental planning improves.

## 7. Government Telecommunications Agency Development Program

### 7.1 Introduction

The Government Telecommunications Agency (GTA) provides voice and data/message transmission services to federal government departments on a shared basis and other services on a customized basis.

Both the voice and the data/message transmission facilities are being upgraded to handle the demand for increased speed, capacity and flexibility resulting from the growth of communications traffic and the development of new, office automation-related requirements. Much of the existing government network has remained essentially unchanged in efficiency and service level for over twenty years, but by the mid 1980's responsive, economical shared office communications facilities will be available through the Agency.

### 7.2 Status of Facilities and Services

#### 7.2.1 Voice Network Service

Local and intercity voice communications are the predominant GTA service offering, but more than six percent of the traffic carried by the government intercity voice (IX) network is data, message or image type information such as communications between word processors and facsimile. Local (intracity) services are provided on either a consolidated or a non-consolidated basis, depending on the number of government users in the area, the features available and the relative cost of alternative facilities.

In a consolidated arrangement, federal government buildings in the same geographical area are linked by a local telephone network dedicated to government use. This local consolidation is generally restricted to a single city, but the Ottawa/Hull, Hamilton/Burlington and Vancouver/Victoria consolidations each involve two geographically close cities. Consolidations are located coast to coast and interconnected by means of the intercity network. New consolidations are scheduled for cutover in Abbotsford and Kingston in October 1981 and in Sudbury in early 1982. Chicoutimi, Sept-Îles and Scarborough are under consideration.

In a non-consolidated network arrangement, government premises are served by regular business lines or leased PBX facilities. Access to the intercity network is gained via FX lines, tie trunks or OPX lines to the nearest local consolidation.

### 7.2.2 Data/Message Network Services

GTA offers one major shared data service, namely the Government Data Network (GDN), a low speed telenet-type service negotiated with CNCP Telecommunications. The GDN carries approximately six percent by value of total federal government data/message communications, this traffic being mainly teletype. In current terminology, the GDN is a message communications network. Data transmission lines are acquired by departments on a customized basis from GTA or direct from the common carriers. The GDN serves a certain market and will continue to be offered while higher capacity, more flexible message services are being developed.

### 7.2.3 Teleconferencing

The Agency offers a shared audio teleconferencing service negotiated with TCTS. Use of this service has grown significantly since its advantages as a substitute for travel were brought to the attention of departments through an Administrative Practice, now incorporated in the Administrative Policy Manual, Chapter 436 section .3.

### 7.3 Development Program

Cooperation with the common carriers and the Canadian high technology industry in field trials is a key feature of the GTA development program. This cooperation is expected to lead over time to the establishment of an integrated government network to handle voice, data, text, image and video transmissions, given the commitment of the carriers to the evolution of a common digital communications medium.

#### 7.3.1 Voice Network Service Development

An urgent need has been identified for local network services with substantially more capacity to support modern communications requirements than those now in place. For this reason substantial effort is being directed towards the development of local communications facilities. The major planned innovation is the introduction of digital switching to upgrade the local and intercity (IX) networks. This includes the interconnection of federal government PBX (private branch exchange) switches.

During 1981/82 the Agency will complete planning for the replacement of existing local and toll telephone exchanges across Canada with digital switching facilities offering enhanced service. The first conversion is scheduled for Ottawa/Hull in 1983. Conversions in other major consolidations are being planned in conjunction with TCTS and local carriers.

By early 1982 a national plan will be completed for the interconnection of federal government PBXs where regulations permit. Once implemented, this plan will enable local networks based on departmental switches to be linked to each other and the common carrier networks, thus laying a foundation for efficient and economical interdepartmental voice and data communications.

### 7.3.2. Data/Message Network Service Development

An incremental approach to the enhancement of shared government data services has been adopted. The first step is to improve the efficiency of existing facilities. Then a new or modified network will be introduced, merging eventually with other shared facilities into an integrated network capable of transmitting all forms of information. Research towards the achievement of this ultimate objective is being conducted in 1981/1982 with a view to keeping pace with common carrier service development programs.

Particular attention is being paid to communications support for office automation, starting with links between word processors and progressing eventually to support for a full range of requirements, including information retrieval, filing and even electronic funds transfer. Local network offerings such as those described in Section B.3, connecting heterogeneous terminal devices, are being researched. The Agency is prepared to advise its clients on the merits of these offerings and will ensure that gateways are provided to link departmental LANs to other local networks and the facilities of the common carriers.

Preparation for office communications support has led in 1980/1981 to the establishment of a pilot network linking word processors in GTA headquarters and five regional offices over the intercity network. During Phase I of a three phase development program the network will be extended to selected other departments using facilities already in place (81/82), a government-wide office communications service will be developed (82/83), and an Office Communications Centre will be established in GTA.

In Phase II innovative Canadian equipment and carrier messaging services will be tested for compatibility with government systems (81/82), and the government office communications service will be enhanced (82/83).

Phase III will produce a universal government office communications network permitting interconnection of all government office communications systems. This network will rely on the use of a standard Virtual Terminal Protocol and Open Systems Interconnection (OSI) protocols now being developed by the international standards community (see Section B.2.8). Consequently, Phase III work consists of research, testing and evaluation of proposed standards for government use (the Virtual Terminal Protocol in 1981/1982 and OSI standards from 1982/1983 to 1984/1985).



#### 7.4 Teleconferencing

The Agency intends to enhance its shared audio teleconferencing service as carrier offerings become more sophisticated and demand develops. During 1981/1982 national trends in both audio and video conferencing and the capability and performance of available equipment, including new terminals and slow scan TV, are being studied. In 1982/1983 a plan will be developed for the enhancement of the shared audio service.

#### 7.5 Satellite Communications Networks

The Agency is studying the feasibility of using satellites to handle high volume government business traffic and of interconnecting the projected mobile satellite (MSAT) network with the government intercity network.

The Agency initiated studies with both CNCP and TCTS in 1981 to identify cost effective ways of using the Anik B fixed satellite for rooftop to rooftop transmission between government office buildings. The development program will continue through the implementation of a government satellite communications network in 1983/1984:

- 1982/1983 - Field trial of DOC/CNCP SLIM TDMA satellite network (Anik B 14/12 GHz)
  - Field trial of TCTS TDMA Integrated Satellite Business Network (ISBN) (Anik B 6/4 GHz)
  - Evaluation of potential to integrate satellite communications networks using TDMA and SCPC technologies with the government intercity voice network.
- 1983/1984 - Development of network specifications and applications for fixed satellite communications
  - Implementation of satellite communications network services.

The feasibility of linking the proposed mobile satellite network with the government intercity network is being studied and will continue to be studied through 1986, when the first MSAT satellite is to be launched. Preliminary market studies indicate that most federal government requirements for mobile services could be met by this system.

8. Case Study in Designing an Organization for Office Communications Systems Development - Introduction

Outside large corporations in the vanguard of the application of information technology, few organizations have yet managed to establish a focal point for the planning, development and control of the network-based communications systems of the 1980's. Yet such a focal point is a prerequisite when success is measured by the ability of systems to meet a very broad range of user needs and to account for convergence in both technologies and functions.

Because this challenge is still very new, no textbooks are available to instruct management in how to proceed. However, an organizational concept being applied in Employment and Immigration and in the Health Protection Branch of National Health and Welfare provides an example which other departments could follow.

This approach is to create a forum in which appropriate departmental staff meet with each other and representatives of other key departments and agencies to tackle issues as diverse as systems design and skills development. The forum consists of a network of interlocking committees and working groups supported by a network of terminals. Members of the committees and working groups "meet" whenever they communicate with each other via their terminals, and liberate time to work on office automation development by using the terminals in their regular work. In effect, elementary office automation is used to introduce more sophisticated forms of office automation. Participants understand the technology, its benefits and limitations through experience. These features enhance cooperation, permit the pitfalls of the traditional committee or project team approach to be avoided, and contribute to management development.

An outline of the approach is presented in Appendix 3 for use as a point of departure in organizing for office communications systems development. Abbreviated terms of reference are defined for a series of committees and working groups, and a means of integrating them is discussed. Membership, agendas and the precise relationship between the groups have all been defined for the two departments in question. These topics are however covered only indirectly because they will differ from one department to the next and within large departments which approach office automation on a branch by branch and/or region by region basis. It may be possible to deal with topics in a general way next year, once experience has been gained with the practical application of the organizational network concept.

9. Case Study in Financing Office Automation Development

The previous edition of the Annual Review recommended that departments investigate the savings potential inherent in switching from traditional communications media such as paper and voice to less costly media such as screen-based electronic communications. The preliminary cost analysis on which this recommendation was based was contained in the Conceptual Definition supporting that edition.

One government organization which has acted on this recommendation is the Canada Employment and Immigration Commission. The Commission's investigation has led it to conclude that its office automation development program could be financed entirely out of savings which would accrue from three media switch projects. These savings have been estimated at many millions over the years, not including further savings expected from improved efficiency and effectiveness which can be quantified only with practical experience in using the new systems. Some front end investment in terminal equipment is required to make the media switch possible, but costs can be cut quickly enough to finance the development work almost from the beginning. The Commission is now proceeding with the media switch projects and development work, demonstrating that it is possible to develop comprehensive office communications systems without major increases in budget in either the short or the medium term.

Details of the analysis can be obtained from EIC. The findings are unique to the Commission, with the exception of the storage cost figures presented as a basis for the media switch analysis. Thus they should not be adopted by other departments without a similar analysis. Note also that these figures are preliminary. The cost of communications at EIC is now being examined closely, and the actual costs which emerge from this analysis will be used as the basis for detailed planning of an incremental development program.

## C. Administrative Policy Analysis

### 1. Introduction

An important aspect of DOC's function of planning and coordinating telecommunications services for government departments and agencies is the analysis of government telecommunications administrative policies and related directives, guidelines and practices. Policy analysis is introduced in this Annual Review for the purpose of providing a reference for the identification, elaboration and discussion of issues related to the efficient and effective management and use of telecommunications resources. The coordination function should improve priority setting for the formulation and development of new administrative policies as required by departments and in accordance with both DOC and central agency policy objectives. This section also includes administrative policy issues relevant to information technology and office automation.

The analysis will also address areas of policy-related concerns and suggest recommendations for policy development at both central agency and departmental levels. Based upon an examination of the opportunities and problems related to telecommunications and information technology, the initial focus is upon the identification of issues which impact upon policy formulation and development. This will include a study of the needs and benefits as well as existing and potential impediments to the development of effective automated office communication systems in the federal government environment.

Policy Analysis is fundamental to the planning and decision-making processes for office automation. In recognition of the convergence of technologies and the integral role of telecommunications as the binding agent in office automation, it is essential to promote the development of policies which facilitate that convergence and maximize its benefits.

It is hoped that this analysis will assist departments to cope with a rapidly changing technological environment, to understand the role of telecommunications in that environment, and to make viable decisions in light of the myriad of available alternatives. Policy development in the forthcoming year should centre upon:

- (a) improved efficiency in the management and use of telecommunications resources;
- (b) the integration of telecommunications, computer communications and office equipment in support of office automation; and
- (c) the basic articulation of direction that will assist in the efficient and effective planning and accomplishment of objectives, goals and priorities in accordance with real needs.

Given that office automation is in the early phases, the federal government is in the advantageous position of being able, through shared knowledge and expertise, to identify issues, to suggest solutions and strategies to ensure the realization of benefits, to alert departments to potential problems and to promote the development of proactive policies. Policy must not only provide guidance for action, it must also allow flexibility for the coordinated evolution of the components of the automated office: management, systems/facilities, organizational structures and personnel. Effective policy analysis, coordination and development depends upon the essential contribution of departments and agencies in the definition of policy requirements and the articulation of policy-related issues via their annual telecommunications reports and plans.

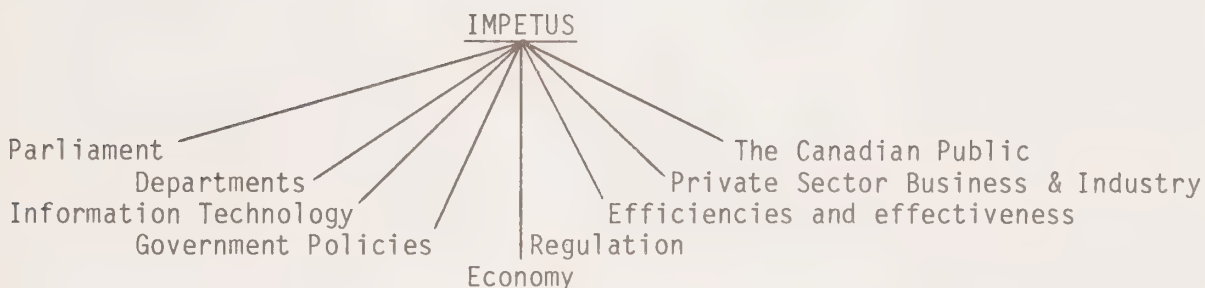


## 2. Telecommunications Policy Development Process

### 2.1 Introduction

The following section provides a basic outline of the intra-governmental telecommunications policy development process. The components identified are the IMPETUS, i.e. the factor(s) necessitating the formulation or revision of policy; the ORIGINATOR i.e. those who draft policy for consideration by the appropriate body; and the PROCESS from development to endorsement and PROMULGATION.

### 2.2 Outline of Process



### ORIGINATOR

#### Treasury Board Canada

##### Administrative Policy Branch:

- develops, revises and interprets policies and guidelines for telecommunications administration.

- promulgates policy.

#### Department of Communications

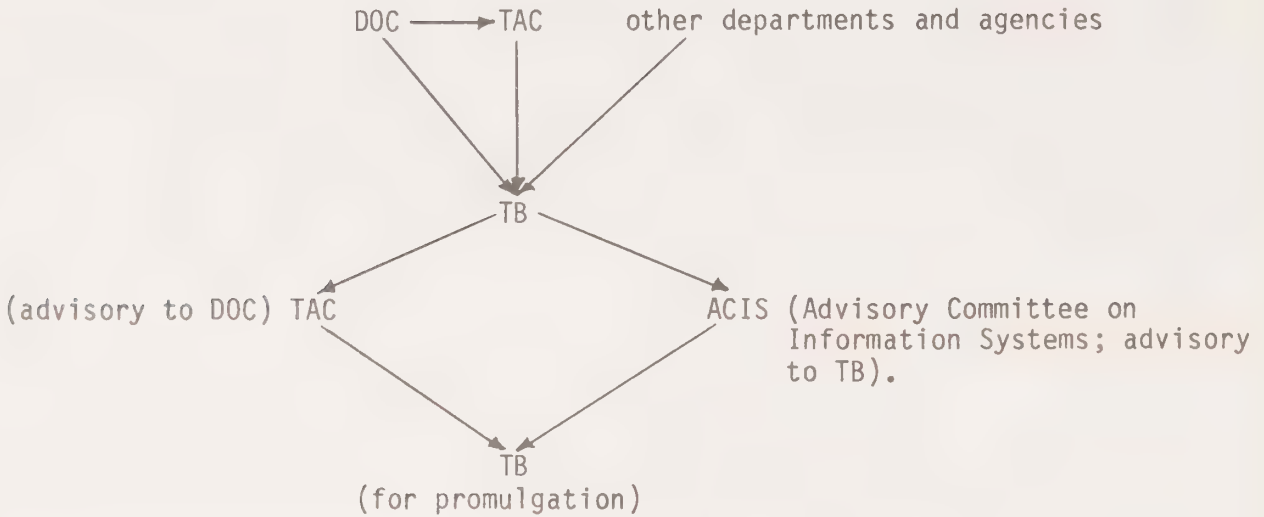
- telecommunications, communications and the Office Communications Systems Program.

- GTA: plans and coordinates telecommunications services for departments, branches and agencies of the Government of Canada.

- input from the Telecommunications Advisory Committee (TAC) and Departmental Telecommunications Coordinators.

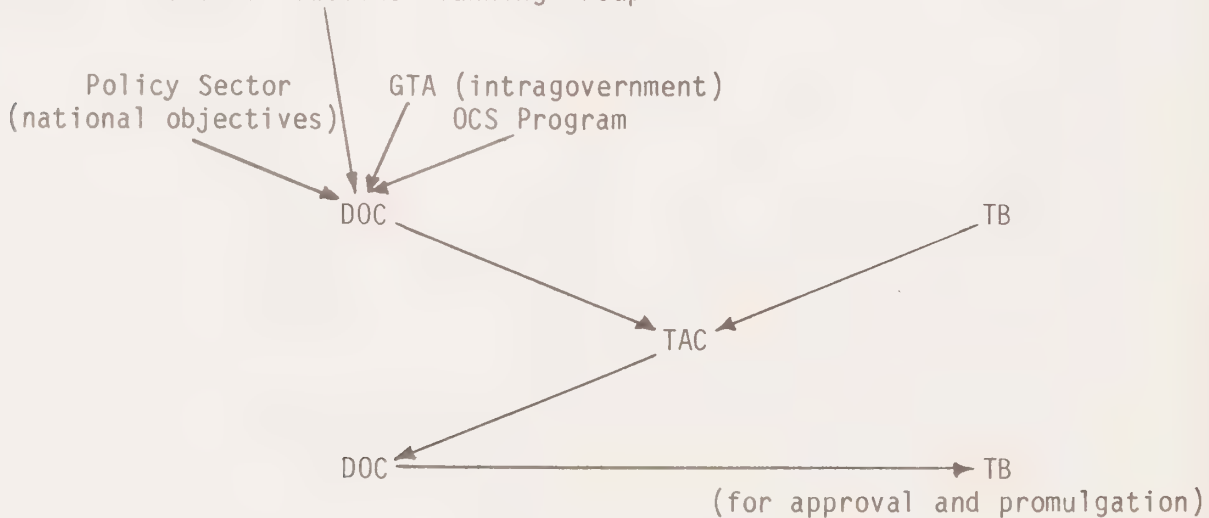
PROCESS

(a) APM 435 (policy statements and objectives; directives and guidelines).



(b) APM 436 (Administrative practices are unique to the telecommunications community).

Government Telecommunications Planning Group



PROMULGATION

- A. Administrative Policy Manual, Chapter 435 - Telecommunications Administration and Chapter 436 - Telecommunications Administrative Practices.
- B. GTA Circular Letters: practices and procedures to enhance utilization and maximize economies of GTA services to government departments (shared data, IX shared voice, local shared service, directory services).
- C. Departmental Telecommunications Policy: internal departmental policy and procedures to ensure implementation of and compliance with APM 435 and 436, GTA circular letters and departmental policies.

3. Report on Past Year

3.1 Administrative Policy

(a) APM 435 and 436

A significant achievement for government telecommunications was the inclusion in Treasury Board's Administrative Policy Manual of Chapter 435: Telecommunications administration and Chapter 436: Telecommunications administrative practices.

A Telecommunications Advisory Committee working group, composed of representatives from Transport Canada, External Affairs, DND, RCMP, DOC/GTA and chaired by TBC, developed the draft chapters. These drafts were subsequently endorsed by both TAC & ACIS.

The areas of major change in APM 435 include Planning, Practices, Standards and attachment regulations, Telecommunications Coordinators, Evaluation and Monitoring and Financial coding (Appendix B).

Planning. The planning process and the role of the Annual Review are highlighted. Departments are now required to maintain an inventory of telecommunications facilities and equipment and identify their telecommunications requirements as part of their budgetary planning process (i.e. for Budget Year Operational and Multi-Year Plans). In addition, it is now requisite that senior departmental management approve the Annual Telecommunications Report & Plan before it is forwarded to Treasury Board Canada.

Practices. A definition of administrative practices has been added and the practices themselves (formerly TB circulars) incorporated in Chapter 436. APM 435 requires that departments adhere to these practices.

Coordinators. A section has been developed to support the policy objective "Foster the sharing of telecommunications expertise and staff, and allow for the development, retention and optimum utilization of qualified technical and managerial telecommunications personnel taking into account specific departmental telecommunications infrastructure and career development programs." The designation of a departmental telecommunications coordinator is now mandatory and must be at a senior level with appropriate responsibility and authority. The corresponding guidelines emphasize the necessity for career development programs and training for telecommunications personnel.

Evaluation and Monitoring. The chapter includes a substantial section on evaluation which requires that departments evaluate and measure telecommunications at both the resource and policy levels,

maintain appropriate statistics, and develop internal policies and practices. Monitoring information is included to assist departments in the performance of that function.

Telecommunications Financial Coding. Appendix B complements OCG circular 1980-53 and represents the first phase of a major revision affecting the coding of telecommunications expenditures.

Information Technology. It should be noted that APM 435 has as one of its objectives to "ensure the future consistency of telecommunications administration, especially in areas where computers and office equipment combined with telecommunications have a significant impact in creating new services and areas of use for telecommunications." In addition, the policies, objectives, guidelines and directives contained in this chapter may be applied within the field of information technology to general applications such as office communication systems and office automation. Therefore, departments may consider developing the appropriate policies for inclusion in their own Departmental Telecommunications Manual.

#### (b) Departmental Telecommunications Policies

Many departments have emphasized the development of internal telecommunications policies, directives and guidelines to assist them in operational areas as well as in adapting and complying with Treasury Board policies. Some departments have developed a comprehensive Telecommunications Policy Manual.

DOC, in conjunction with several departments, is currently developing a Telecommunications Coordinators' Manual. The manual will be divided into three sections: 1) TB policies 2) GTA organization and services 3) departmental policies and procedures. It will be the responsibility of individual departments to complete the third section.

Several departments are developing policies in the area of emerging telecommunications services in order to establish standard control mechanisms to facilitate on-going control, evaluation and long-range planning.

#### (c) Administrative Practices

Two new administrative practices developed last year were first released in APM 436. The Long Distance/Intercity Telephone Services practice will assist departments in controlling expenditures for long distance telephone calls. (See Appendix 1 section 3.6 for a sample cost comparison of telco DDD and the GTA IX network.) The practice on Bilingual Telephone Services represents an



integration of telecommunications administrative policy and official languages policy.

The Treasury Board Canada circular providing practices for Government of Canada Listings in Public Directories was revised to incorporate concepts and procedures developed in response to the Cabinet decisions on Service to the Public. It is also included in APM 436.

#### (d) Policy Requirements

In their Annual Report, DND noted that "present advances in communication and electronic technology are creating a climate of possible uncontrolled and uncoordinated growth in acquisition and utilization of carrier leased services for voice, narrative and DATA traffic." Subject to priorities established by TB, practices will be developed to assist departments in the acquisition and use of PBX and facsimile equipment. Departments may suggest other subject areas for development as administrative practices. Suggestions should be directed to the Departmental Telecommunications Coordinator (for screening, aggregation, comparison with practices under development) who will then submit them either to their TAC member who can advise DOC or directly to GTA's Planning and Coordination Division.

### 3.2 Telecommunications Personnel

#### (a) Telecommunications Coordinator

The appointment of a departmental telecommunications coordinator has been made mandatory in APM 435:

Each deputy head shall designate, at a senior level, one or more telecommunications coordinator(s) with the appropriate degree of responsibility and authority to ensure the effective, efficient and economical use of telecommunications resources. The coordinator(s) will act as the focal point with appropriate authority through which departmental users are represented in the planning, acquisition, utilization and evaluation of telecommunications services. For liaison between the department and DOC, DSS and TB, a primary contact point is to be designated. Where telecommunications personnel at a suitable level are not available, the department may designate the same coordinator(s) as for the EDP Policy, or personnel in a planning or other central function.

The role of the coordinator is essential to effective telecommunications management and the control of telecommunications resources (material, financial, and human) within a department. The establishment of an organization for telecommunications management will be essential for large user departments and may be appropriate for other departments.

### (b) Occupational Profile

The occupational profile for the position of departmental telecommunications coordinator identifies eight functional areas which should be addressed. These areas, referenced in APM 435, are: advise management on telecommunications matters; act as the departmental representative with other Departments and Central Agencies; develop short and long term plans for telecommunications; address major changes in departmental operational needs in telecommunications; ensure effective use of telecommunications facilities; coordinate the acquisition of telecommunications facilities; monitor departmental telecommunications expenditures and compliance with Government policies; and ensure adequacy of security measures for telecommunications facilities in accordance with established departmental security measures and procedures.

A sample job description based upon the Profile is available from GTA's Planning and Coordination Division (DPC). Departments who have classified position analysis schedules for telecommunications positions/functions and who would be willing to share such information for the benefit of other departments involved in similar exercises may send copies to DPC. DPC would then make these available to other departments for reference. Such cooperation may enable the development of a benchmark position(s) for inclusion in TB Standards.

### (c) Telecommunications Training

Telecommunications is a substantial component of office automation and much work is required to identify the related telecommunications skill requirements. DOC is currently investigating the most appropriate means of fulfilling identified telecommunications training needs with respect to the management of telecommunications (see the Report on Telecommunications Training and Needs Identification, DOC, 1980). DOC is proceeding on behalf of government departments and is working with interested departments in order to meet their needs.

Telecommunications training is essential if departments are to manage their resources effectively and to enable departments to comply with Treasury Board policy and guidelines designed to ensure the efficient and economical allocation and use of telecommunications resources. It would be beneficial if all departments reported on the telecommunications training elements required and anticipated both in the Annual Telecommunications Report and Plan and as part of their Human Resources Planning. This would allow the aggregation of needs and the provision of training to meet identified service-wide requirements.

Of the 59 departments which submitted Reports, only five departments indicated that budgetary provisions were made for telecommunications training in the reporting year and as part of their overall telecommunications plan.

As identified in this extract from a departmental report: "Telecommunications staff need to be upgraded technically and administratively to deal effectively with the growing importance of the office of the future, DMS issues and telecommunications costs." The Ministry of State for Economic Development refers to increasing use of communications-based technologies in business and consumer information services.

However, the prospects are wider than that, for the use of these technologies may be expected to extend rapidly into the whole area of management, technical control and monitoring. It is a realistic assumption that the medium-term deployment of human resources in Canada will be subject to change more from advances in communications and computer technology than from any other cause. And although the level of unemployment in Canada is disagreeably high there is a chronic shortage of supply of persons with the skills needed in a high technology society. There is an urgent need for integrated planning of training and apprenticeship programs in the high technology field, and the integration must include not only several departments of the federal Government but also the concerns and responsibilities of other levels of government and of industry in general.

An important aspect of telecommunications and information technology training is the provision for career development opportunities for government personnel. The identification of career paths and the corresponding training elements which permit telecommunications personnel to progress through a variety of positions leading to management level would develop valuable expertise within government departments and agencies.

While one of the Government's development priorities is assigned to "initiatives that contribute to the Government's economic development objectives, and in this regard to give appropriate emphasis to manpower development and training," it is nevertheless incumbent upon the telecommunications community to identify needs and the means by which they may be addressed.

### 3.3 Digital Multiplexing - Policy Considerations

Another technology already widely introduced by operating telecommunications carriers is that of digital multiplexing. This technique may have a major impact on local distribution systems in the medium to long term. Digital multiplexing is a means of more readily accommodating channels carrying voice, data, video and other signals on the same telecommunications system. Digital technology offers significant technical and economic advantages in communication systems and services. The feasibility of digital switching has been demonstrated by operational systems in recent years and there has been a corresponding increased use of digital transmission systems largely because of progress in the design and production of microelectronic circuits.

GTA will be introducing digital multiplexing and other central office digital switches within the federal government telephone network at a number of locations across the country. This will make possible improved service and additional feature offerings by the telephone companies. The impact of this new technology and related items like service offerings, tariff, and policies requires co-ordinated evaluation to ensure GTA users receive an efficient and cost-effective service.

GTA has prepared a circular letter to advise departments of some of the issues related to the acquisition of PBX/PABX equipment and its potential effect upon the implementation of digital multiplexing. Several departments have reported the postponement of a decision with respect to PBXs until the details of digital multiplexing are available. To facilitate the departmental planning process, GTA should provide a cost-benefit analysis to users as soon as rates and tariffs are announced by Bell Canada.

Some of the policy considerations related to digital multiplexing are:

- The introduction of digital centrex service on a government-wide basis may have an impact on departmental PBXs.
- The potential of interconnect terminal attachment will be enhanced by digital technology which can support a broad range of applications to meet the diverse needs of departments.
- More efficient and economical provision of service/ information to meet Service to the Public requirements may be realized through the implementation of digital technology.
- The introduction of digital multiplexing with its wide range of features may affect the desirability of retaining a PBX already purchased/leased; therefore, departments should consider the pay-back period, break-even point and the GTA implementation schedule before acquiring PBX equipment.



### 3.4 Interconnect/Terminal Attachment - Policy Considerations

The liberalized terminal attachment permitted in CRTC interim decision 80-13 raises a number of issues which should be considered by departments:

- . radically changing methods of deriving tariff rates.
- . vendors marketing equipment containing state-of-the-art technology which could, in many cases, exceed the requirements of the user at greater expense than necessary.
- . users acquiring equipment for interconnection without realizing the implications regarding the need for providing technical and materiel assistance and support.
- . the need for legal assistance when arranging interconnect contracts with carriers due to the intricacies of permissive and non-permissive clauses in the contract, which will be very difficult to challenge when differences in interpretation occur.
- . compatibility with other existing and planned government systems.
- . government policies, directives, guidelines and administrative practices governing the acquisition and administration of telecommunications equipment and services.

Health and Welfare has expressed a concern regarding the negative impact of interconnect in terms of "more piece-meal acquisition of equipment, which will tend to be uncontrolled (much like micro-computers in EDP). This type of equipment will likely be acquired without the necessity of review or reference to any central plan for telecommunications". To eliminate or minimize this, DOC should ensure that their planning process with respect to government networks and facilities is widely publicized and that the appropriate personnel are available to discuss these plans with interested departments.

Analysis of several interconnect case studies has indicated that on a dollar for service comparison, customer-owned terminal equipment is economically advantageous. However, the comparison should not end there. The hidden costs in terms of human resources must also be considered. In addition, the cost comparisons used present prices and have not considered the probability that these prices have been set in order to attract and establish a client base. Significant increases are extremely likely in a year or two in order that these companies may achieve reasonable and healthy profits. In addition, it is probable that



tariff changes will occur which will allow carrier companies to become more competitive. Therefore, present cost comparisons may not be representative of future costs.

For the most part, departments have agreed to wait until the CRTC makes its final ruling and formal government policies and practices are in place. It would seem reasonable, therefore, that the development and promulgation of government-wide interconnect policies and practices should be a priority.

With respect to the human resources side of interconnect, both MOSST and SSC reported concerns in the area of training and its relation to effective management and utilization. In light of regulatory developments (terminal attachment and interconnect), the Ministry faces a growing challenge to heighten its cost-consciousness with respect to available technology, and to expand its technical knowledge of the telecommunications field in concert with ongoing innovation. SSC reports an urgent need to provide training in the understanding and use/application of tariff rates and regulations as issued by both federally and provincially regulated carriers.

### 3.5 OCS Program

DOC's Office Communications Systems Program and its objectives are described in general in section B.2.7.1.1. The following discussion highlights some of the policy issues related to the Program and the development of office communication systems within federal departments and agencies.

To qualify as an office communications systems project, as distinct from an EDP project, projects submitted to the OCS Program for potential sponsorship are evaluated according to the following basic criteria:

1. the ability of the system(s) selected to satisfy all of the diverse occupations/functions performed in the office environment;
2. whether or not the system is designed to utilize and merge (tele)communications, EDP and office products; and
3. The ability and willingness of the people (contractors) designing the system to put together a multi-disciplinary team (i.e. equipment, training, assessment, behavior).

These parameters may also be applied by departments to determine whether in-house proposals for office automation are sufficiently diversified to demonstrate the capability and viability of merging technologies to meet the defined needs and objectives.

The pilot projects to be sponsored by the OCS Program are experiments in technology hardware and software development and will test the practicality of new equipment and systems. Contracts have been awarded to develop evaluation methodologies in order that the tools are available to analyze projects in the technical-economic and the human-social areas. The OCS Program anticipates sponsoring four department-initiated and four industry-initiated projects for trial within the federal government.

The Users Group of the OCS Program is composed of senior managers from government departments and is a forum for them to share information on how they can or will get involved in office automation/communication systems. While this group will not be directly involved in policy development, it is noteworthy that the Chairman is the Deputy Secretary of the Administrative Policy Branch, Treasury Board Canada.

In support of the national objective of stimulating Canadian industry and the development of Canadian information technology products, it would be beneficial, on a government-wide basis, to:

1. buy equipment that may be used in widely operating systems, e.g. CPM;
2. standardize purchases in order to promote software portability; i.e. software developed by one department could be shared among other government departments.

An OCS Policy Paper entitled "Field Trial Participation Guidelines (Vol. 1)" has been prepared for the User Group. It details how field trials should take place, the terms and conditions of funding, project organization, results, reporting, etc. Copies of the paper are available from DOC's Office Communications Systems Program.

### 3.6 Policy Issues: Case Studies

Appendix 5 presents three case studies which cover a variety of issues from a policy perspective. The first presents Revenue Canada Taxation's examination of telecommunications expenditures in order to effect reductions where feasible and their study of the impact of the CRTC interim decision on interconnect. Both of these provide a solid basis from which to move economically and effectively toward office automation.

The second case study presents some of the policy issues identified by CEIC with respect to the development and implementation of their office automation plan.

The third case study deals with one specific component/tool of office automation: communicating word processors. The pilot project, conducted by DOC, is documented in terms of its objective, phases, evaluation components, and findings and experiences to this point in time.

Other government departments and agencies involved in the conduct of pilot tests are encouraged to share the results of those tests, including cost-benefit analysis, evaluation methodologies etc., if available. DOC/GTA should coordinate the establishment of a library/index of reports and studies available.

#### 4. Office Automation: Opportunities and Problems

Office automation brings with it opportunities to be realized and dangers to be avoided. Awareness of the opportunities and the potential pitfalls of office automation will assist both the decision-maker and the user. It is essential that questions be raised and it is intended that this section generate questions for consideration by departments both collectively and individually. Everyone will gain if questions and answers are shared.

For, although it is true that there is no time to be lost in acting upon office automation, it is equally true that we cannot afford to lose time by making poor decisions through inadequate knowledge and planning.

##### 4.1 The User

###### Opportunities

- . to increase the efficiency and effectiveness of the individual user and the organization as a whole.
- . to plan for the implementation of office automation and to develop a five year plan by defining organizational objectives in acquiring the technology as well as what the technology is expected to do. Note that the planning process establishes the framework for determining the optimum timing for pilot tests and implementation and enhances decision-making, whether office automation is to be immediate or delayed.
- . to improve information/communication flows and adapt them to the needs of the user.
- . to improve the methodology of work itself.
- . to increase users' knowledge, skills and scope.
- . to influence the development of equipment and services designed to meet user needs.

### Problems

- acquisition as a result of technology push rather than as technology applied to meet user requirements (demand pull).
- defining office processes and functions in order to determine how the benefits of office automation for a particular organization may be maximized.
- viewing office automation as improving or enhancing only the individual user in the performance of an autonomous function rather than looking at overall organizational effectiveness.

## 4.2 Productivity

### Opportunities

- to improve the productivity of all workers in the office: executives, managers, professionals, secretaries, clerks.
- to improve the quantity of work (i.e. measurable output), the quality of work (i.e. a superior product or end result) and the personal benefits (i.e. better organization, less time wasted on unproductive tasks such as photocopying).
- to improve all programs supported by telecommunications and information technology.
- to develop activity profiles for various groups for the determination of the most appropriate automated tools and in so doing, to eliminate ineffective or redundant tasks/procedures and to achieve a better understanding of office and work procedures.

### Problems

- productivity measurement is difficult, especially at the managerial and professional levels.
- productivity potential can be negated if organizational structure is not compatible with new procedures and processes.
- failure to consider, measure and evaluate the intangible benefits of office automation (in fact, many businesses prefer the higher quality of service or superior product resulting from the application of office technology).
- unrealistic expectations - there is a learning curve of several months to one year, depending upon the degree of technical sophistication of the system/facilities/equipment and related procedures.



### 4.3 Organizational Structure

#### Opportunities

- . to develop organizational structures designed to realize productivity gains and enhance the abilities of personnel in doing their jobs (consider: does a word processing pool really increase the productivity of the organization as a whole or would the integration of word processing with the producing environment prove more beneficial in all three areas of productivity, i.e. qualitative, quantitative and personal?)
- . to develop structures based upon the following parameters of organizational considerations:
  - 1) Procedures - work assignment and scheduling.
    - productivity expectations
  - 2) Systems Requirements - centralized or distributed
    - technically sophisticated or user friendly
    - service bureau or in-house
  - 3) Facilities. - number and location of work stations
    - open or closed system
    - communications and work flow patterns
- . to promote interdependent work groups, matrix management.
- . to increase the flexibility of work place (people unable to travel may be able to work from home with a portable terminal and remain as productive, thereby eliminating the necessity of hiring a term or inexperienced person and maximizing the benefits to both employer and employee).

#### Problems

- . failure to restructure an organization in a way which maximizes the use of new technology.
- . an organizational distinction between telecommunications and EDP perpetuates a conflict and disfunctional structure which is not conducive to office automation (integration is difficult to achieve).
- . "clearly, there will be a need for more innovative approaches in reorganizing the workplace: job sharing, reduction in the work week, retraining programs, complete redefinition of duties, and so forth." (EOW News).

#### 4.4 Human Factors

##### Opportunities

- to involve personnel at all levels in the planning and decision-making process.
- to implement user friendly equipment which, when designed to enhance performance, can ensure credibility, use and success of a new system and can overcome resistance.
- to develop training and career path programs which will provide skilled information workers and the potential for guided advancement.
- to involve personnel officers (classification and staffing) and union representatives at the planning stages.
- to provide flexibility within job descriptions for individuals to expand the scope of their work, assume increased responsibilities and gain knowledge and expertise in additional areas.

##### Problems

- lack of skilled personnel to perform needs and cost-benefit analysis, develop design alternatives, use new equipment and procedures.
- requirement for new management techniques.
- failure to communicate changes, reasons for change.
- imposition of technology on office workers - it is important to remember that information technology should be implemented to support people in the performance of their work.

#### 4.5 Cost Justification

##### Opportunities

- reduce the cost of operating the office (this is especially important in light of the increasing cost of traditional office methods).
- salaries are increasing while the cost of equipment is decreasing at the following rates: communications - 11% per year; computer logic - 25% per year; computer memory - 40% per year.
- energy efficiency and conservation of natural resources.
- compare costs of integrated technologies to stand alone equipment.
- develop shared office communication services and systems thereby adding economies of scale to the economic benefits of technological innovation and increasing the return on investment.
- consider the costs involved in not implementing office automation at the present time.
- office automation may be implemented using a phased approach to avoid excessive initial capital outlay.

##### Problems

- financial constraints with respect to high investment.
- rapidly advancing technology may render current state-of-the-art technology obsolete; therefore, it is advisable to acquire technology which can evolve to accomodate advancements; investigate lease rather than buy opportunities; and avoid restrictive long term contracts.
- short term benefits may cause long term expenses - know what is required over both the short and long term in order to maximize investment.
- issue of standards and equipment compatibility - a user department which has to accomodate multiple standards or the lack thereof has to pay more to satisfy its particular system requirements; ultimately it is the user who supports the cost of complication resulting from the need to adapt equipment or facilities having differing standards and characteristics.
- requirement to ensure that contracts will meet identified needs and provide adequate follow-up service - know what you're paying for.

## 5. Policy Issues

There exists a general recognition that government must adopt policies which encourage and stimulate industrial development in the area of office automation and policies which protect Canadian-made products. To complement this, government must develop administrative policies which promote and facilitate the effective implementation and use of this technology in the federal office environment.

There are a number of parameters affecting implementation and policy analysis is being conducted in such diverse areas as: the definition of government-wide goals and objectives in acquiring this technology, personnel, procurement procedures, classification, organizational structure, management and the integration of EDP and telecommunications. Rather than imposing constraints, policies in these areas must allow for the most effective evolution of people, workplace, organization and tools.

Notwithstanding that modern communication systems are cost efficient they are also insecure and create vulnerabilities which otherwise would not exist. If information warrants protection it should not be sent, processed, stored or handled in an electromagnetic communications system unless the system is protected to COMSEC Standards. (Refer to para 1 Chapter 4 of document entitled "Security of Information in the Public Service of Canada").

To begin, there is the requirement to establish office automation as a general government priority. Objectives may include: increasing the efficiency of government offices, improving the productivity of office workers, enhancing the responsiveness to the needs of the public, and the realization of economies. As a major user of telecommunications and information technology, the Government of Canada can provide leadership to the Canadian business community in general by realizing and maximizing the benefits of office automation.

### 5.1 Organizational Issues

#### 5.1.1 Integration

The integration of the departmental organizational components responsible for EDP and telecommunications may eventually be essential for the effective implementation and management of office automation. This prerequisite has been identified in some of the annual telecommunications reports:

i) "It would be appreciated if future Annual Reviews could address the subject of EDP and Telecommunications planning integration. Today's world is such that there is a blending of the two technologies to the extent that it is difficult, in several instances, to differentiate between what is EDP and what is Telecommunications. It appears logical, therefore, to foster some cross fertilization...."

"In Transport Canada we have made some small inroads in this area and it is our intention to investigate it further. The Annual Review could be used as a tool to foster better understanding between the two groups and also promulgate any information on the subject to all Government Departments."

(Transport Canada)

ii) "The departmental experience, at present, is that the integration of telecommunications, EDP and word processing is important and must be addressed now. The telecommunications policy as it stands, does not help with this integration. ...the amalgamation of the Annual Telecommunications Report and Plan and the Annual EDP Report and Plan should be given top priority."

(Health and Welfare)

There are several key issues to be addressed in resolving the integration of the EDP and telecommunications reports. The format for the telecom report was restructured this year to more closely correspond to that of the EDP report. There is, however, a distinctly different application of the two reports. The EDP report forms part of the budgetary process and must be approved by Treasury Board. The Telecom report is an integral part of the departmental planning process and, as such is designed to provide both guidance and support for telecommunications planning. The integration of these reports represents an important step which would facilitate the organizational coordination of EDP and telecommunications within individual departments and agencies. In addition, decisions must be made regarding where some equipment, systems or facilities are reported. For example, should word processors be reported in EDP or telecommunications? And if there is a communications package? Until such time as those questions are resolved, it would seem most appropriate to include the same information in both reports.

While the organization of telecommunications and EDP within departments is essentially a departmental prerogative, leadership and assistance should be provided for the general guidance of those departments which may benefit from the integration of these disciplines. DOC, as the department responsible for telecommunications services for the government, and the Treasury Board, as the body approving EDP plans, should jointly establish a committee, with appropriate representation from concerned departments, to investigate this issue and provide a series of recommendations to TAC and ACIS. Departments may assist in this process by identifying their requirements and related issues and problems in their annual reports and plans.



### 5.1.2 Central Agencies

As the government develops and enacts national policies supportive of office automation it will become necessary to develop corresponding intragovernment policies which will permit departments to utilize that new technology.

For example, budgetary provisions must be made for the conduct of pilot tests, the purchase or lease of equipment/facilities, and for the full development and implementation of office automation. Flexibility is desirable in order that departments may obtain equipment and develop procedures to meet their unique requirements. Not all departments have the same needs and organizations must be able to evolve.

Central agencies must be prepared to consult with unions and advise departments on matters which affect union personnel. The kinds of issues of concern to unions - physical workplace, health and safety, effect of office automation of employment and job classification, impact on membership, to name a few - may arise within some departments much earlier than in others. Answers and alternatives should be available before the problems are manifested and uncontrollable.

Those central agencies with mandates for training at the service-wide level should identify priorities and skill requirements. While it may not be the responsibility of government to train and/or retrain on a massive scale, the needs and future needs of government must be articulated before they can be addressed. Again, individual departments can contribute to this process by identifying their needs and priorities in the appropriate reports to central agencies; e.g., Telecom Report and Plan, human resources plan, EDP plan.

While the expectations with respect to office automation are exceedingly high, central planners and policy developers and implementers should recognize that mistakes will be made. However, these mistakes will be less costly if the information learned from them is shared among all departments. As a result of the exchange of information mistakes need be made only once. In spite of productivity improvement expectations, it should be recognized that person year requirements will increase in specific areas and may actually increase overall in the initial phases of office automation.

The establishment and maintenance of a central telecommunications inventory system for government becomes increasingly important with the advent of office automation technology. Not only will access to the inventory identify users of compatible equipment and facilities or services but will allow departments to acquire equipment (if purchased not leased) no longer used by another

department. Technological obsolescence may be a less significant deterrent to those departments ready to move ahead if others coming along can use the less sophisticated/fewer features equipment. Departmental cooperation and participation in IOTA (Inventory of Telecommunications Applications, see Appendix 1) and the maintenance of an inventory as identified in APM 435 (section 3.2.2) will contribute significantly in this regard.

### 5.1.3 Departments and Agencies

Organizational issues impact on the government as a whole and upon individual departments and agencies. In the developmental stages, structures should be designed for guidance rather than control (this does not negate the importance of evaluation and accountability). It should be recognized that just as some departments are further advanced than others, there will be areas within individual departments that will be in the vanguard of office automation. In both cases it will be those with a need and an application who are prepared and willing to move into this area. Such initiatives should be fostered.

Departments will face such problems as

- . organizing for office automation, i.e. how to bring it about;
- . organizing the office to accept new technology, i.e. physically, people, work procedures and communication patterns;
- . organizing for the results, i.e. increased productivity, need to increase functions and expand responsibilities.

Internal policies and audit procedures are a essential component of this evolutionary process. DOC and TB are available to provide assistance to departments.

## 5.2 People Issues

There are a number of contentious issues with respect to the impact of information technology and office automation on the office worker - health, safety, job specification, displacement, unemployment, impact on female employees, increased segregation of "male" and "female" jobs. These notwithstanding, policy development is required not only to maximize the benefits of office automation to the organization but to the workers as well.

Personnel must be prepared for change - knowledge, understanding and involvement are the keys to acceptance. As telecommunications is an integral part of office communications systems, it seems realistic to build upon an existing knowledge base. As stated by the Department of Indian Affairs and Northern Development:

"Of great importance over the next five years will be the training of personnel in order to meet with future demands. It is suggested that while some of this training can be obtained through private sector training courses, this Department would encourage the development of training courses, in concert with GTA and the Public Service Commission, to enable those persons charged with the responsibility of managing telecommunications to obtain the knowledge and expertise necessary to keep abreast of technological advances."

Personnel must be trained to use new equipment and facilities, to work and manage in the environment, and for career advancement.

As responsibilities and functions evolve, job descriptions and classifications must be flexible enough to accommodate changes. Personnel officers themselves will have to receive some training in order to fulfill the changing staffing requirements.

The adoption of user friendly systems will increase the rate of acceptance of new technology, encourage use and reduce the learning curve. This is true for all levels within the government: executives, managerial and professional, secretarial and clerical. Well planned pilot tests, visibly located, can generate enthusiasm and alleviate the fears among other people in the office.

One of the major expectations of office automation is increased productivity. The potential exists; stimulative personnel policies are required to ensure its realization. The provision of automated tools is not enough in itself to increase productivity. Excessive and unrealistic productivity expectations can be detrimental, paralyzing all office workers. Orientation, training, career development programs, appropriate classifications, flexibility and the assurance that the "people" side of business is not neglected are essential. The confidence derived from this should stimulate a well-motivated and productive workforce.

### 5.3 Management Issues

Office automation can never be realized to any truly beneficial extent without the commitment of senior management. That commitment can only be made if management is knowledgeable about information technology, its costs and benefits and its impact upon all areas within the organization.

In order to assess, management must be informed. This could be realized, in part, by the inclusion of an information technology/office automation segment as one module of the Senior Management training program. Training will be required for managing the various phases of office automation, managing change and using the tools designed to support management.

To ensure awareness and provide a continuous cycle of information and evolution, DOC might produce an Informatics Quarterly Report. Such reports could be designed and timed to fit the departmental management and budgetary cycle, thereby relating to information they have available as well as that they need. For example:

IQR-January	: report on departmental plans
IQR-April	: case studies
IQR-July	: statistical data - expenditures, personnel, etc.
IQR-October	: Annual Review, including Policy Analysis and Long Range Planning Framework.

Performance measurement (i.e. efficiency, effectiveness, economy) is difficult in the environment of the automated office, yet remains an essential component in management's accountability process. Policies and tools designed to define and facilitate performance measurement in government would be highly beneficial.

A concept which has been discussed but which as yet remains undefined, is that of the "Information Manager". The delineation of specifications for the "Information Manager", a generalist capable of telecommunications, data processing and administrative management, may provide departments with the focal point needed to maximize the benefits of office automation. The development of an Information Manager profile would be timely and valuable for departments.

### 5.4 Summary

At this point in time, a general articulation of direction or guide to action (a basic definition of "policy") is requisite in order that government departments and agencies can proceed with office automation. The process has begun; departments are implementing office automation. Positive central direction is necessary to provide a cohesive approach, to ensure that individual goals are in concert with the overall goal of government.



D. Recommendations

1. On Planning and Management

- 1.1 DOC and TBC should take joint action to harmonize the planning and coordination of telecommunications and EDP in light of the merging of technologies, in consultation with the Telecommunications Advisory Committee and the Advisory Committee on Information Systems.
- 1.2 The Government Telecommunications Agency should broaden the scope of GTA circular letters to provide additional information in support of federal government telecommunications policy and procedures and inform departments of sources of more extensive telecommunications training.
- 1.3 Departments should plan appropriately for training of telecommunications personnel and investigate innovative methods of stimulating awareness of developments in communications and their implications for the way in which business is conducted in the federal government.
- 1.4 The Department of Communications should continue to identify new applications of innovative developments in federal government telecommunications and bring these to the attention of departments.

2. On Shared, Customized and Departmental Services

- 2.1 In light of the rapid, simultaneous changes in both technology and the supply structure occasioned by the liberalization of terminal attachment, GTA should undertake the following:
  - (i) retendering of existing and potential consolidations and sharing opportunities in order to maximize benefits to government users.
  - (ii) development of guidelines for departments to assist them in evaluating their requirements for PBX and PABX services, for example, new non extension type PBXs and integrated voice/data switches.
  - (iii) development of Administrative Practices, for promulgation by Treasury Board, to guide departments in the acquisition of departmental, shared and customized services involving terminal attachment.



### 3. Progress on Previous Recommendations

#### On Planning and Management

1. *The Department of Communications should take the lead in fostering cooperation among departments in the planning, development and implementation of innovative government telecommunications applications and systems, with priority on office communications systems and the use of satellites.*

DOC publishes the Annual Review to provide departments with a perspective on how to proceed. The Government Telecommunications Agency organizes pilot tests and trials of new common carrier offerings and applications of office communications technology. The DOC OCS Program Users Group has become a forum for interdepartmental discussion and cooperation.

2. *In conjunction with the initiatives of Treasury Board Canada to establish a comprehensive policy and development strategy for the use of information technology, departments should evaluate their internal policies, procedures and organizational structures to facilitate the integration of telecommunications, data processing and office administrative functions permitting the efficient and effective management of information. The Department of Communications should proceed to establish recommendations for a policy framework aimed at the efficient and effective use of telecommunications as the binding agent in the management of information.*

There is clear evidence that departments are acting on this recommendation as reflected in the 1980/81 Annual Review. As an initial step, DOC has introduced the section on Policy Analysis for the purpose of providing a reference for the identification, elaboration and discussion of issues related to the efficient and effective management and use of telecommunications resources.

3. *Departments should establish the position of Telecommunications Coordinator in accordance with the Occupational Profile for Telecommunications Coordinators.*

Chapter 435, Section 8 of the TB Administrative Policy Manual gives effect to this recommendation and indications are that departments are taking steps to meet the requirement of the directives.

4. *The Department of Communications should extend its seminars for departmental telecommunications staffs to include those responsible for departmental planning.*

Departments have reacted positively to the invitation from DOC with many departmental telecommunications and planning staffs attending the seminars in February 1981.

5. *The Department of Communications should evaluate the impact of liberalized terminal attachment regulations on government telecommunications administration and provide guidance to departments and make recommendations to Treasury Board Canada on this matter.*

GTA is reviewing the impact of terminal attachment on the government as a whole and has advised departments on the ramifications of acquiring telecommunications equipment in light of the interim CRTC decision.

6. *To facilitate the orderly development of federal telecommunications standards, the mandate of existing government standards bodies should be reviewed. The Department of Communications should consult with departments and make recommendations to Treasury Board Canada on this matter.*

The DOC in conjunction with the TAC is continuing its dialogues with the TBC and other interested parties regarding the need for federal telecommunications standards, possible institutional arrangements and appropriate representation from the telecommunications community in the process of developing these standards.

#### On Shared Services

1. *The Government Telecommunications Agency should provide departments with information to facilitate the development of their main estimates with respect to telecommunications.*

A user forecast was provided to departments in September and will be distributed annually at that time.

2. *In reviewing their use of existing telecommunications and in planning and developing new applications of information technology for their operations and for program delivery, departments should consider using existing and planned government shared networks to ensure economies of scale and compatibility of communications within the government.*

Indications are that departments are acting on this recommendation.

3. *Departments should consult GTA concerning the use of shared intercity facilities during off-peak hours to optimize the use of these facilities and to achieve savings. Departments should also examine, in conjunction with GTA, how facsimile and communicating word processing equipment can be used to best effect on the local and intercity shared government networks.*

There are indications that departments are using the network in a more effective manner including the increasing use of communicating word processors and similar equipment.

#### On Customized and Departmental Services

1. *Departments should take steps to evaluate the effectiveness and economy of media switch in their particular applications. For example, the use of innovative office communications systems such as communicating word processors, multifunctional terminals and electronic messaging systems to replace paper, voice and face-to-face meetings should be examined.*

There is evidence that departments are acting on this recommendation.

2. *At the same time, departments with representative requirements and/or special expertise should join with the Department of Communications in the cooperative testing, evaluating and development of innovative office communications systems. The results of this collaboration should be made available to other departments.*

The OCS Program Users Group provides a forum for this type of collaboration, and it is intended that results be made available to other departments.

3. *Departments should assess their current use of facsimile in light of recent developments in technology, including the consideration of other cost effective alternatives.*

GTA has received a limited number of requests from user departments for guidance in the acquisition and use of facsimile services.

4. *Departments should consult the Department of Communications as early as possible when considering attachment of customer provided equipment to common carrier and GTA networks.*

GTA has received a number of requests and a collaborative process was established to satisfy the requirements.

## E. APPENDICES





## APPENDIX 1

### Telecommunications Expenditures, Personnel and Systems

#### 1. Telecommunications Expenditures and Related Personnel

##### 1.1 Introduction

The following information relates to telecommunications expenditures and personnel involved in providing telecommunications services within the Federal Government Of Canada. Under the direction of Treasury Board Canada and with the authority specified in Chapter 435 of the Administrative Policy Manual, this information was requested via the Annual Telecommunications Reports and Plans from all departments and agencies named in Schedules A and B of the Financial Administration Act whose telecommunications expenditures exceeded \$20,000 per year. For the year 1980/81 information was collected from 59 departments and agencies, an increase of 7 over 1979/80. The following departments/agencies reported for the first time in 1980/81: Canada Labour Relations Board, Canadian Human Rights Commission, Commission for Federal Judicial Affairs, Ministry of State for Economic Development, Northern Pipeline Agency, Status of Women, and the Supreme Court of Canada.

From analysis of Public Accounts records it has been determined that the Annual Telecommunications Reports and Plans surveyed represent 98.4% of the total federal government telecommunications expenditures. The outcome of this analysis has been considered to ensure that all data presented in this document are representative of the total federal government.

Since departments and agencies with a low level of expenditure account for a minor portion of total expenditures, it is recommended that Treasury Board Canada consider raising the qualifying amount from \$20,000 to \$100,000 per year.

Historically telecommunications expenditures have been requested by economic objects, but as a result of the general nature of the economic objects in place difficulties were encountered with respect to the differentiation and accuracy of data. During 1980/81 unique economic objects specifically defined for telecommunications were implemented. With standardized financial accounting tools now available improved control and knowledge of telecommunications expenditures is inevitable, and as a result better reporting in the Annual Telecommunications Report and Plans will be forthcoming.

1.2 Annual Telecommunications Reports and Plans - Methodology and Response

During March 1981 Treasury Board Canada delivered to each department/agency copies of the requirements for the 1981 Annual Telecommunications Reports and Plans. Concurrent with this, seminars were held to familiarize departmental telecommunications personnel with the instructions for fulfilling these requirements, the Annual Review of Telecommunications in the Government of Canada, and with telecommunications in general. Attendance and feedback by departments with respect to these seminars was generally good. Particular departments found they were of such value that they had their regional telecommunications staff attend. Seminars will again be presented early in 1982 and those departments/agencies required to submit an Annual Telecommunications Reports and Plans will be invited to participate. Departments/agencies with regional telecommunications staff are encouraged to have them attend so that they become familiar with instructions defining the reporting requirements first hand.

Difficulty was encountered by many departments/agencies in meeting the June 30/81 due date for submission of the Annual Telecommunications Reports and Plans. Departmental feedback indicated the reasons for this difficulty were: lack of staff available for completion of the reports and plans in a timely manner, lack of an automated financial system that facilitates completion of the reports in the specified format and the time consuming requirement of collecting planning information from a variety of high level persons within the department.

While these problems may have had some validity in the past, recent developments within the government telecommunications environment should have alleviated them. With the issuing of the Administrative Policy Manual, Chapter 435, Appendix B, by Treasury Board Canada and a memorandum from the Office of the Comptroller General, economic objects were defined specifically for telecommunications. With these economic objects in place telecommunications management is equipped with the tools required to have financial administration produce financial information in the detail and format required for good management. A side benefit of this will be the availability of data for easy input to the Annual Telecommunications Reports and Plans. In addition, Treasury Board Canada's issuing of the Administrative Policy Manual, Chapter 435, section 8.1.1, requires that deputy heads designate at a senior level one or more telecommunications coordinator(s) with the appropriate degree of responsibility and authority to ensure the effective, efficient and economical use of telecommunications resources. The coordinator(s) will act as focal point with

appropriate authority through which departmental users are represented in the planning, acquisition, utilization and evaluation of telecommunications services. With these policies now in place departmental telecommunications coordinators will be knowledgeable about all telecommunications activities and plans. In addition it is anticipated that the format of future Annual Telecommunications Reports and Plans will be similar to that of the 1981 edition.

Any departments needing interpretation or assistance in the implementation of these policies should contact the Administrative Policy Branch of Treasury Board Canada.

## 2. Financial Status

### 2.1 Total Telecommunications Expenditures (Refer to Table 1)

Total telecommunications expenditures including telecommunications personnel related expenditures grew by 16.8% in 1980/81 to \$408,267,000. This is in keeping with historical growth rates within telecommunications of 15-20% annually. It however deviates significantly from the previous year's growth rate of 1.9% which was considered exceptional and due to unusual circumstances present at that time, for example the government restraint program. The growth rate of 16.8% compares with the 17.3% growth rate forecast for 1980/81 in last year's annual review.

A more detailed look at total telecommunications expenditures reveals that telecommunications operating expenditures grew by 5.7% in 1980/81, and that telecommunications capital expenditures grew by 46.9%. As well it is observed that telecommunications personnel related expenditures increased by 22.7%

Growth in 1980/81 total telecommunications expenditures has been attributed to several factors:

1. significant increases in tariffs
2. significant increases in capital expenditures
3. increase in telecommunications personnel due to greater emphasis on telecommunications management
4. new technologies being adopted by organizations in an attempt to increase efficiency.

2.2     Telecommunications Operating Expenditures  
(Refer to Table 1)

Total telecommunications operating expenditures increased by 5.7% for the year 1980/81 to \$202,554,000. This growth rate is significantly lower than anticipated based on historical growth of 12-20% and given the tariff increases introduced in 1980/81. The reduction in growth of telecommunications operating expenditures may be in part a result of direct purchase of voice communications equipment. Along with these changes in expenditure patterns it can be observed that telecommunications repair expenditures have increased. This may be due to expenditures for repair of owned or leased equipment.

It is anticipated that in the next few years the pattern of spending within operating expenditures will change and that overall operating expenditures will grow at a more moderate rate than in the past due to increased competition between carrier and non-carrier companies.

2.3     Total Telecommunications Capital Expenditures  
(Refer to Table 1)

Total telecommunications capital expenditures for 1980/81 increased by 46.9% to \$72,205,000. Historically growth in telecommunications capital expenditures has been at 16-25% with the exception of 1979/80 showing negative growth of -13.9%.

This significant growth in telecommunications capital expenditures has been attributed to several factors:

1. upgrading of existing services
2. the "catch up" of purchases delayed in 1979/80 because of the federal government restraint program in place at that time
3. the adaption of technologies by organizations to increase their efficiency, e.g. communicating word processors, etc.

It appears that part of the growth in telecommunications capital expenditures was at the expense of growth in telecommunications operating expenditures. This is partly due to the trend towards direct purchase and installation of telecommunications equipment.



## 2.4 Telecommunications Personnel and Related Expenditures (Refer to Tables 1, 4 and Graph 1)

Total telecommunications personnel reported in 1980/81 amounted to 7102 person-years, up 16.7% from 1979/80. It can be observed from Graph 1 that 7.2% of total telecommunications staff are in managerial positions, 20.4% are in coordination positions, 63.2% are in equipment operation positions, 8.0% are in engineering/ maintenance positions and 1.2% are in engineering/support positions. It can also be observed from Table 4 that a variety of classifications exist within each of these position types and within the telecommunications environment generally. It is anticipated that with the acceptance and implementation of new technologies emerging, the character of telecommunications personnel as a whole will change with more person-years being allocated to managerial and coordination functions and fewer to equipment operation.

Telecommunications personnel related expenditures increased in 1980/81 by 22.7% to \$133,508,000. This increase is a result of increased numbers of telecommunications personnel being reported and increases in salaries paid to telecommunications personnel ranging from 8-14%.

## 2.5 Shared, Customized and Departmental Services

Analysis of the 1977/78 - 1980/81 telecommunications expenditures reveals the following information concerning shared, customized and departmental services utilized by the federal government.

	<u>Shared</u>	<u>Customized</u>	<u>Departmental</u>
<u>Voice</u>			
1980/81	45.2%	2.6%	52.2%
1979/80	38.3%	3.4%	58.3%
1978/79	42.6%	3.8%	53.6%
1977/78	50.0%	7.0%	43.0%
<u>Data</u>			
1980/81	4.4%	3.1%	92.5%
1979/80	4.4%	3.9%	91.7%
1978/79	3.3%	2.5%	94.2%
1977/78	6.0%	4.0%	90.0%

It can be observed from this information that the percentage of shared voice services has increased in 1980/81 while the percentage of departmental voice services has decreased. This is understandable given that GTA has shown an increase of 7.9% in its operational expenditures recovered and at the same time departments have reported a decrease in telephone services expenditures of -1.6%.



### 3. Government Telecommunications Agency Charges

#### 3.1 Charges to Government Departments for Telecommunications Services

1980/81 GTA total billings for telecommunications services provided to government departments increased by 7.9% compared to 1979/80. This included a 7.6% increase in intercity voice charges, a 12.4% increase in local voice services and a 7.9% increase in intercity data services. The following table sets out GTA charges by voice and data, local and intercity services for the years 1979/80 and 1980/81.

BREAKDOWN OF OPERATIONAL  
TELECOMMUNICATIONS EXPENDITURES  
FOR 1979/80 AND 1980/81  
RECOVERED BY GTA

		\$	GTA Revenue Breakdown	Increase From Previous Year	
1980/81	Voice	Intercity	45,299,421	80.5%	7.6%
		Local	2,741,677	4.9%	12.4%
	Data	Intercity	8,243,696	14.6%	7.9%
		Local	*	*	*
	Total		56,284,794	100.0%	7.9%
1979/80	Voice	Intercity	42,096,543	80.7%	3.3%
		Local	2,438,987	4.7%	6.0%
	Data	Intercity	7,634,622	14.6%	19.6%
		Local	*	*	*
	Total		52,170,152	100.0%	4.9%

\* Cost of data local services is included with data intercity.

### 3.2 GTA Operating Expenditures

Operating expenditures, which represent the cost GTA incurred for telecommunications services it managed and made available to other government departments, increased in 1980/81 by 7.3% over 1979/80. Most of this 7.3% increase is attributed to tariff revisions.

### 3.3 GTA Overhead Expenses

GTA overhead expenses account for approximately 10% of total costs recovered. This has remained fairly constant over the last few years even though additional work has been taken on in the following areas:

- 1) The development of telecommunications guidelines and practices.
- 2) Development work in the areas of emerging technology such as field trials of a communicating word processor network and of the Anik B satellite.
- 3) Advising on the implementation of communications support to Service to the Public.

### 3.4 GTA Telecommunications Services

The Agency manages six major services:

- 1) Intercity Voice Services
- 2) Local Shared Services
- 3) Shared Data Services
- 4) Customized Services
- 5) Consulting Services
- 6) Directory Services

For more details about GTA services refer to the Administrative Policy Manual, Chapter 435, Appendix A.

### 3.5 TB Project - Examination of Telephone Expenditures

In 1981, Treasury Board Canada initiated a project intended to identify areas of potential savings of Federal Government telephone services. Four departments - Revenue Canada-Taxation, Communications, Employment and Immigration and Transport Canada were requested to participate by examining their telephone expenditures with cost savings in mind and with special emphasis on opportunities related to interconnect.

Preliminary results of these studies and of a telecommunications study previously instituted by Revenue Canada-Taxation indicate savings may be possible from:

- reconfiguration of existing telephone systems and long distance services;
- purchase of telephone equipment previously rented from the telephone companies;
- reduction in the level of service of the government telephone network to achieve an appropriate balance between level of service and cost;
- improvement in control of telephone access cards;
- elimination of long distance calls through the public network to points accessible by the government network;
- elimination of duplication by departmental telephone directories of information found in the government directory;
- on going audit and verification of telephone equipment bills against actual installed equipment and personnel on strength to ensure payments are not unnecessarily made; and
- employing traffic surveys to justify where additional telephone lines are required or can be removed.

This list is not intended to be all inclusive and the sequence of the items listed does not indicate priority or where the maximum savings can be realized. It merely illustrates that opportunities for improvement exist and can be realized through an effective ongoing telecommunications management program.

Questions concerning project methodology and specific details about results should be directed to the Administrative Policy Branch, Treasury Board Canada. Details of these studies should be of interest to all departments as they will provide a base from which to implement their own telephone services evaluation projects.

3.6 Comparison of Costs of Using Government Intercity (IX)  
Network and Public Long Distance Network

The following information provides a comparison of the costs involved in placing some typical long distance calls from government telephones using direct access to the government intercity (IX) network and direct dialling (DDD) on the public long distance network.

COST OF TYPICAL 3 MINUTE LONG DISTANCE CALLS

DURING BUSINESS HOURS

<u>Origin</u>	<u>Destination</u>	<u>*IX Network (direct access)</u>	<u>Public Long Distance Network (DDD)</u>	<u>% Cost Savings Using IX Network</u>
Ottawa	Kingston	\$ .51	\$1.25	59.2%
Ottawa	Montreal	\$ .60	\$1.31	54.2%
Ottawa	Toronto	\$ .69	\$1.49	53.7%
Ottawa	Windsor	\$ .84	\$1.66	49.4%
Ottawa	Calgary	\$1.65	\$2.97	44.4%
Ottawa	Halifax	\$1.23	\$2.43	49.4%
Ottawa	Vancouver	\$1.95	\$2.97	34.3%
Ottawa	Winnipeg	\$1.35	\$2.70	50.0%

\* Government intercity network charges used to derive the above information include the portion of GTA overhead applicable to these services. If call access codes are used an additional charge of \$.30 per call is levied.

From the information presented above, it becomes very obvious that significant savings can be realized by using the government intercity network rather than the public long distance network. The sizable savings that can be had from using the government intercity network should encourage people to use this network whenever possible and should demonstrate to telecommunications management personnel the value of monitoring the telephone usage within their departments as set out in Chapter 436, section .6, of the Administrative Policy Manual.

### 3.7 Highlights Concerning Shared Voice Network

A trend towards the use of PBXs is apparent, particularly in the National Capital Region as Centrex main lines and extensions decreased by about 2000 and 1000 respectively in 1980/81, while (PBX) main lines and extensions increased by 1913 to 8349 in 1980/81. This observation and the fact that rentals and capital investments have increased considerably are a result of movement towards use of equipment from suppliers other than the common carriers.

1980/81 reporting of consolidation activities by the Regions reveals that the monthly commercial long distance charges per line increased by 15% to an average of \$17.88. This figure is verified by the charges reflected in the departments' Annual Reports and Plans, ie. a total DDD expenditure of approximately \$30 million.

Other activities in the shared voice network have shown minimal changes. Aggregate working-day calling traffic increased 2.8% to an average of 108,200 calls. The following table reflects the terminal status on all 21 consolidations as of April 1981:

#### TOTAL TERMINALS ACCESSING CONSOLIDATIONS

YEAR	EXTENSIONS	MAIN LINES	RATIO EXT:ML*	TOTAL TERM
1976/77	48,908	72,921	.67:1	121,829
1977/78	57,384	78,289	.73:1	135,673
1978/79	64,309	75,391	.85:1	139,700
1979/80	58,377	75,520	.77:1	133,897
1980/81	58,886	74,814	.80:1	134,230

\* The minimum ratio of extensions to main lines should be 1:1 according to Treasury Board Canada guidelines.



4. Forecast of Expenditures and Personnel  
(Refer to Tables 5 & 6)

This section contains a five year forecast of telecommunications expenditures to assist departments in projecting overall telecommunications costs. Telecommunications operating and capital expenditures have been forecast using exponential regression techniques while forecast data for personnel related expenditures have been developed using growth in person-years reported by departments and a 12% annual cost increase.

The exponential regression technique used to forecast telecommunications operating and capital uses historical data as its basis of prediction. Therefore forces in the future telecommunications environment not present in the past will affect the accuracy of the projections significantly. In 1980/81 a five year forecast was requested from departments. The data reported were in many cases incomplete and questionable. It is anticipated that in future years complete and well based forecast data will be submitted in the Annual Telecommunications Report and Plans and will therefore constitute a major factor in the forecasting of expenditure data. This means that anticipated changes in the telecommunications environment will be reflected in the forecast data.

In addition GTA has provided a user forecast to assist departments and agencies in development of their budgets with respect to telecommunications services supplied by the Agency. This information is contained in GTA Circular Letter No. 81/344 and forecasts that an overall increase of 16% will be experienced from 1981/82 to 1982/83 in the cost of telecommunications services provided by GTA.

TABLE I  
TELECOMMUNICATIONS EXPENDITURES BY CATEGORY

		1977/78 (\$000)	% CHANGE	1978/79 (\$000)	% CHANGE	1979/80 (\$000)	% CHANGE	1980/81 (\$000)
O P E R A T I N G	Telephone Services - common carrier GTA (0220, 0224)	93,006		111,583		112,735		110,886
	Message, Data Communications Ser- vices - common carrier, GTA (0221, 0225)	43,743		47,045		48,323		52,815
	Other Communication Services, Courier Services (0222, 0210)	9,042		16,193		15,031		10,349
	Computer Communication Services (0223)							11,843
	Repair-Telegraph & Telephone Lines (0621)	45		32		10		585
	Repair-Telecommunications Equip- ment excluding computers (0655)	3,449		4,264		4,486		7,750
	Repair-Broadcasting, Radio & TV Relay & Booster Stations, Tele- phone Exchanges (0640)							81
	Repair-Telecommunications Equip- ment for Computers (0667)							315
	Rentals-Telecommunications Equip- ment (0520, 0521, 0522)	7,780		12,163		11,035		20,169
	* Comparable Total (Operating Total (Operating))	157,065 157,065	21.8	191,280 191,280	0.1	191,620 191,620	5.7 12.1	202,554 214,793
C A P I T A L	Telecommunications Equipment - related parts & consumables ex- cluding computers (0780)	15,458		17,109		15,781		21,153
	Telephone & Telegraph Lines (0830)							5
	Broadcasting, Radio & TV Relay & Booster Stations, Telephone Ex- changes (0860)							12
	Telecommunications Equipment ex- cluding computers (0906)	32,129		39,960		33,372		51,052
	* Comparable Total (Capital) Total (Capital)	47,587 47,587	20.0	57,069 57,069	-13.9	49,153 49,153	46.9 46.9	72,205 72,222
T E L E C O M	Professional & Special Services (0423, 0485, 0445)	854		646		656		939
	Salaries (01)	69,541		94,022		108,114		132,569
	Total (Telecom. Personnel)	70,395	34.5	94,668	14.9	108,770	22.7	133,508
	* Comparable Total Telecom. Expen- ditures	275,047	24.7	343,017	1.9	349,543	16.8	408,267
	Total Telecom. Expenditures	275,047		343,017		349,543		420,523

\* COMPARABLE TOTALS: As a result of the implementation of specific economic objects for telecommunications, the 1980/81 totals do not compare with previous years totals. Adjustments have been made to the 1980/81 totals in order to produce totals that are comparable with previous years.

# **BREAKDOWN OF OPERATIONAL TELECOMMUNICATIONS EXPENDITURES FOR 1979/80 AND 1980/81**

YEAR	SERVICE	(\$ ) O2 OPERATIONAL TELECOMMUNICATIONS EXPENDITURES	(%) DISTRI- BUTION OF O2 EXPENDITURES	(\$ ) O2 OPERATIONAL TELECOM. EXP. RECOVERED BY GTA	(%) DIST. OF COSTS RECO- VERED BY GTA	(%) OF TOTAL O2 RECOVERED BY GTA
1 9 8 0 / 8 1	V O I C E	INTERCITY	40.2	45,299,421	80.5	26.0
		LOCAL SERVICES	27.5	2,741,677	4.9	1.6
	D A T A	INTERCITY	22.8	8,243,696	14.6	4.8
		LOCAL SERVICES	9.5	0	0	0
	TOTALS		100.0	56,284,794	100.0	32.4
1 9 7 9 / 8 0	V O I C E	INTERCITY	36.8	42,096,543	80.7	23.9
		LOCAL SERVICES	27.1	2,438,987	4.7	1.4
	D A T A	INTERCITY	27.2	7,634,622	14.6	4.3
		LOCAL SERVICES	8.9	--	--	--
	TOTALS		100.0	52,170,152	100.0	29.6

TABLE 3

**TOTAL TELECOMMUNICATIONS EXPENDITURES  
BY DEPARTMENT (INCLUDING SALARIES)**

DEPTS/AGENCIES	1977/78 (\$000)	% CHANGE	1978/79 (\$000)	% CHANGE	1979/80 (\$000)	% CHANGE	1980/81 (\$000)
1. NATIONAL DEFENCE	111,250	24.8	138,815	- 5.8	130,806	24.4	162,75
2. RCMP	32,008	33.7	42,793	20.3	51,488	26.7	65,23
3. EMPLOYMENT & IMMIGRATION	19,740	31.3	25,913	- 8.3	23,755	26.9	30,14
4. TRANSPORT CANADA	15,629	26.6	19,788	5.3	20,842	7.5	22,41
5. EXTERNAL AFFAIRS	15,536	24.8	19,385	- 3.1	18,786	3.8	19,49
6. ENVIRONMENT CANADA	13,731	-21.0	10,844	36.6	14,816	- 0.4	14,75
7. REVENUE CANADA - TAXATION	6,273	25.9	7,895	15.8	9,145	9.8	10,04
8. SUPPLY & SERVICES	5,377	31.7	7,081	7.8	7,634	22.0	9,31
9. COMMUNICATIONS	5,081	44.6	7,349	- 3.0	7,130	2.8	7,33
10. HEALTH & WELFARE	4,269	22.7	5,239	2.1	5,349	11.7	5,97
11. POST OFFICE	3,580	17.5	4,207	25.8	5,294	10.1	5,83
12. INDIAN & NORTHERN AFFAIRS	5,766	18.7	6,845	-31.1	4,717	11.3	5,25
13. CORRECTIONAL SERVICES	N/A		4,056	3.0	4,176	3.0	4,30
14. REVENUE CANADA - CUSTOMS & EXCISE	2,467	21.8	3,006	2.5	3,080	37.0	4,22
15. AGRICULTURE CANADA	3,310	10.7	3,664	- 0.5	3,645	13.3	4,13
16. PUBLIC WORKS	3,897	-19.5	3,137	5.9	3,321	21.2	4,02
17. INDUSTRY, TRADE & COMMERCE	2,006	37.2	2,752	12.1	3,085	7.7	3,32
18. PUBLIC SERVICE COMMISSION	N/A		1,733	- 2.4	1,691	50.9	2,55
19. SECRETARY OF STATE	1,767	12.6	1,989	- 7.6	1,838	29.7	2,38
20. REGIONAL ECONOMIC EXPANSION	1,741	9.4	1,904	- 4.1	1,825	18.1	2,15
21. VETERANS AFFAIRS	1,047	20.6	1,263	- 0.2	1,260	66.1	2,09
22. STATISTICS CANADA	N/A		2,203	1.7	2,240	-10.1	2,01
23. NATIONAL RESEARCH COUNCIL	973	16.8	1,136	12.3	1,276	21.7	1,55
24. CONSUMER & CORPORATE AFFAIRS	1,090	9.1	1,189	- 1.9	1,167	7.5	1,25
25. NATIONAL MUSEUMS	490	17.6	576	8.7	626	99.0	1,24
26. NATIONAL FILM BOARD	789	18.9	938	0.6	944	27.9	1,20
27. JUSTICE	732	10.1	806	20.8	974	17.1	1,14
28. CANADIAN INTERNATIONAL DEVELOPMENT AGENCY	512	23.2	631	-19.0	511	77.7	90
29. PRIVY COUNCIL	511	26.6	647	- 2.5	631	26.1	79
30. FINANCE	485	15.7	561	- 1.8	551	29.2	71
31. CANADIAN TRANSPORT COMMISSION	483	16.6	563	8.5	611	13.4	69
32. LABOUR	381	38.3	527	- 9.3	478	24.9	59
33. TREASURY BOARD	421	- 1.2	416	12.7	469	21.7	57
34. AUDITOR GENERAL	216	25.5	271	11.8	303	64.7	49
35. NATIONAL ENERGY BOARD	249	36.1	339	15.3	391	14.1	44
36. NATIONAL LIBRARY	191	130.9	441	0.7	444	- 1.4	43
37. CHIEF ELECTORAL OFFICER	43	102.3	87	993.1	951	-60.5	37
38. CRTC	331	7.6	356	-10.4	319	16.3	37
39. PUBLIC ARCHIVES	176	24.4	219	20.5	264	29.2	34
40. NATIONAL PAROLE BOARD	135	73.3	234	3.8	243	- 9.5	22
41. ECONOMIC DEVELOPMENT	N/A		N/A		N/A		18
42. COMMISSIONER FOR FEDERAL JUDICIAL AFFAIRS	N/A		N/A		N/A		17
43. SCIENCE AND TECHNOLOGY	120	5.8	127	-10.2	114	49.1	17
44. NORTHERN PIPELINE	N/A		N/A		N/A		15
45. ATOMIC ENERGY CONTROL BOARD	76	230.3	251	-52.6	119	16.0	13
46. HUMAN RIGHTS COMMISSION	N/A		N/A		N/A		12
47. PUBLIC SERVICE STAFF RELATIONS BOARD	79	0	79	3.8	82	45.1	11
48. ECONOMIC COUNCIL OF CANADA	57	86.0	106	- 2.8	103	14.6	11
49. COMMISSIONER OFFICIAL LANGUAGES	50	60.0	80	7.5	86	29.1	11
50. LABOUR RELATIONS BOARD	N/A		N/A		N/A		10
51. SCIENCE COUNCIL OF CANADA	58	15.5	67	0	67	53.7	10
52. IMMIGRATION APPEAL BOARD	62	24.2	77	5.2	81	19.8	9
53. CANADIAN INTERGOVERNMENTAL CONF. BOARD	N/A		104	-14.4	89	3.4	9
54. SUPREME COURT OF CANADA	N/A		N/A		N/A		7
55. INSURANCE	43	14.0	49	3.9	51	17.6	6
56. STATUS OF WOMEN	N/A		N/A		N/A		3
TOTAL REPORTED	253,248		354,738		337,888		404,966
ADJUSTMENT FOR TOTAL GOV'T REPRESENTATION	11,812		10,173		11,675		15,557
TOTAL TELECOMM. EXP. (INCL. SALARIES)	275,047	24.7	345,017	1.9	349,563	20.5	420,523



**TABLE 4**  
**TELECOMMUNICATIONS PERSONNEL**  
**1980/81**

OCCUPATIONAL GROUP	MANAGE -RIAL	COORDI -NATION	EQUIPMENT OPERATION	ENGINEE- RING MAIN -TENANCE	ENGINEE- RING SUPPORT	1980/81 TOTAL
R- Clerical & Regulatory	1.1	302.1	753.8	-	3.0	1060.0
M- Communications	3.0	7.0	676.1	2.0	-	688.1
S- Admin Services	114.3	166.2	1.3	.1	-	281.9
A- Data Conversion	-	3.0	268.5			271.5
L- Electronics	8.0	-	-	170.0	9.0	187.0
T- Secretarial Etc.	.7	72.3	48.1	-	-	121.1
CY- Secretarial	-	7.8	85.5	-	1.0	94.3
S- Computer Systems Admin	75.3	3.8	2.0	.3	7.0	83.4
S- General Services	-	-	-	56.0	-	56.0
L-MAN- Gen. Labour & Trade-Manipulation	-	-	38.0	-	-	38.0
ES-MES- Messenger Service	-	23.0	-	-	-	23.0
NG- Engineering	1.0	9.0	-	9.0	4.0	23.0
Other Groups	-	7.0	8.0	-	-	15.0
D- Drafting & Illustration	-	4.0	-	-	9.0	13.0
M- Program Admin	-	-	9.0	-	-	9.0
G- Purchasing & Supply	3.2	2.3	-	-	2.0	7.5
I- Financial Admin	5.0	-	1.0	-	-	6.0
CE- Machine Operator	-	-	6.0	-	-	6.0
G- Engineering & Scientific	-	-	-	4.6	1.0	5.6
I- Social Science Support	-	3.0	-	-	-	3.0
O- Radio Operations	-	-	3.0	-	-	3.0
M- Organization & Methods	2.0	-	-	-	-	2.0
S- Information Services	1.0	1.0	-	-	-	2.0
X- Senior Executive	.1	1.0	-	-	-	1.1
ON- Data Processing Data Conversion	-	-	1.0	-	-	1.0
SC TOTAL	214.7	612.5	1901.3	242.0	36.0	3006.5
UNIFORMED						2669.9
CIVILIAN MEMBERS						642.1
OTHER EMPLOYEES						783.5
TOTAL						7102.0



TABLE 5

**TELECOMMUNICATIONS EXPENDITURES  
AND PERSON-YEAR FORECAST**

YEAR	TOTAL TELECOM EXPENDITURES (\$000)	TELECOM PERSON-YEARS REPORTED	FORE- CAST GROWTH %	TOTAL TELECOM PERSONNEL RELATED EXPENDITURES (\$000)	TOTAL TELECOM EXPENDITURES (including Personnel Related Expenditures) (\$000)
76/77	179,935	4,511		61,575	241,510
77/78	205,506	5,206		69,541	275,047
78/79	248,995	5,732		94,022	343,017
79/80	241,429	6,106		108,114	349,543
80/81	287,015	7,102		133,508	420,523
81/82	339,692	7,336	3.3*	154,463 **	494,155
82/83	384,728	7,681	4.7*	181,129 **	565,857
83/84	435,734	7,973	3.8*	210,573 **	646,307
84/85	493,502	8,164	2.4*	241,502 **	735,004
85/86	558,929	8,393	2.8*	278,056 **	836,985

\* Forecast Growth of Telecom Person - Years Provided by Reporting Departments

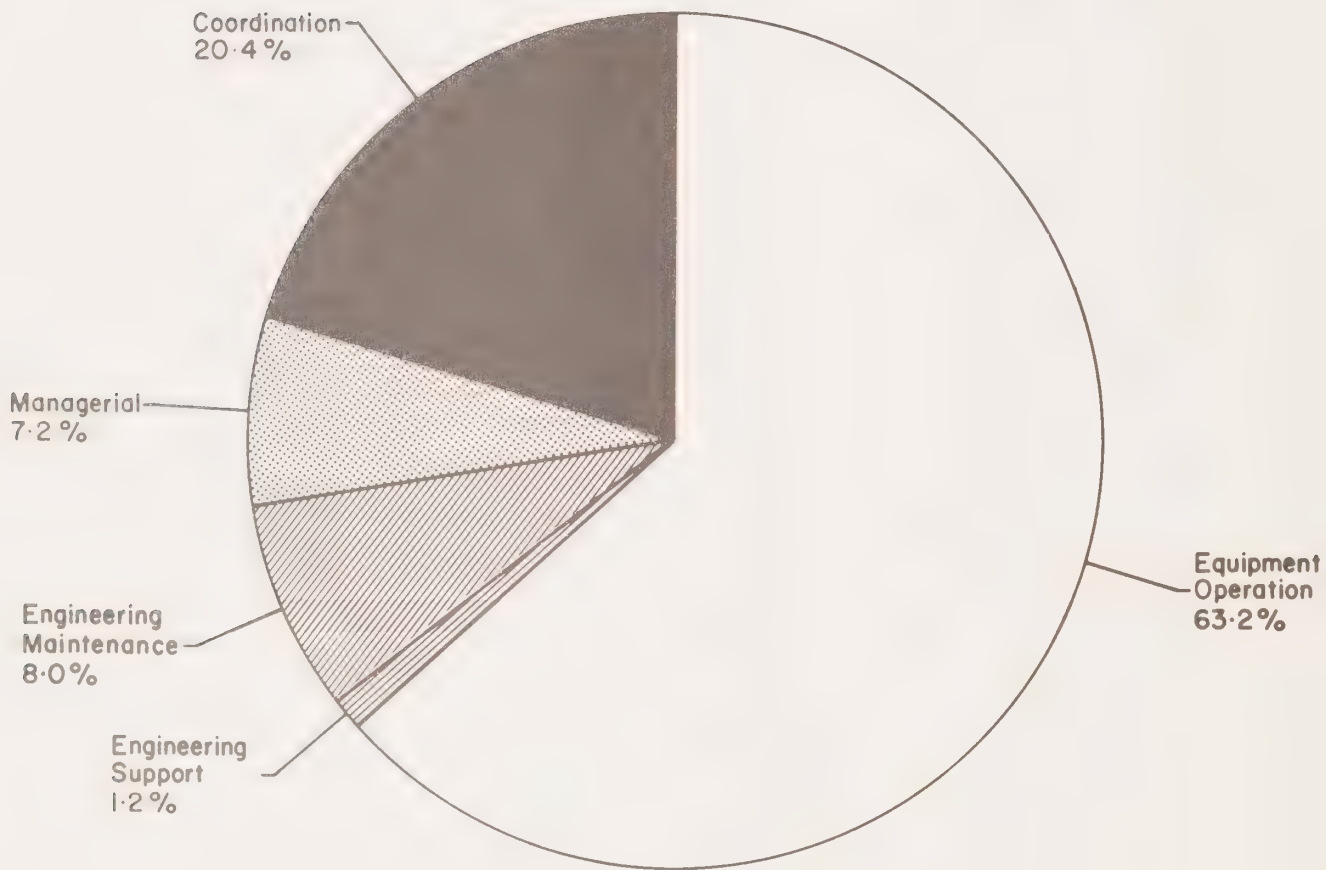
\*\* Personnel Related Expenditures Were Forecast Using Person-Years Growth Forecast and 12% Annual Cost Increase

TABLE 6  
SUMMARY OF FORECAST FOR TOTAL TELECOMMUNICATIONS  
EXPENDITURES

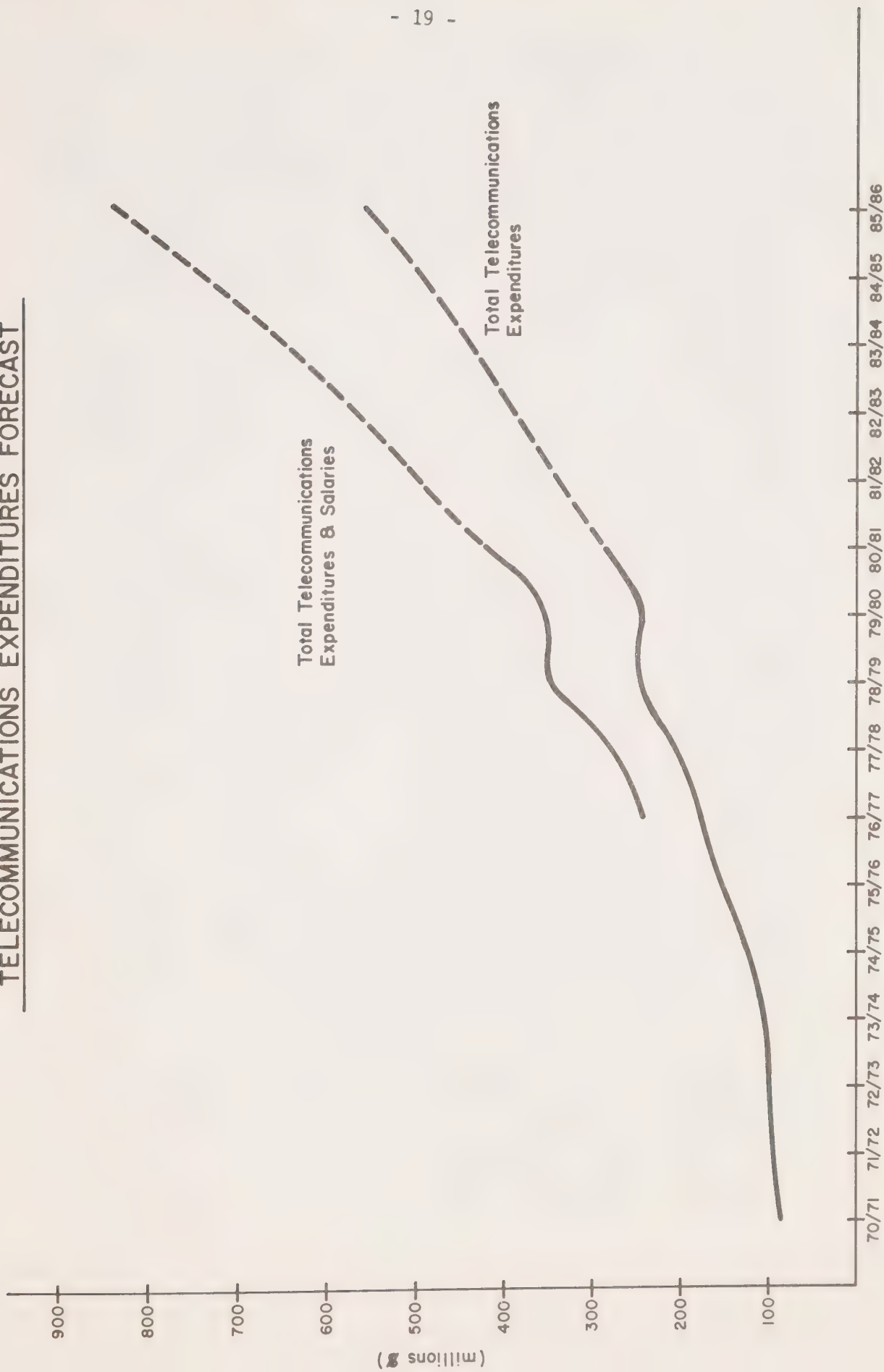
YEAR	TELECOM OPERATING EXPENDITURES (\$000)	TELECOM OPERATING & CAPITAL EXPENDITURES (\$000)	TELECOM OPERATING CAPITAL & PERSONNEL RELATED EXPENDITURES (\$000)
81/82	258,174	340,712	494,155
82/83	290,549	386,031	565,857
83/84	326,983	437,438	646,307
84/85	367,986	495,763	735,004
85/86	414,130	561,946	836,985

GRAPH I

PERCENTAGE PUBLIC SERVICE TELECOMMUNICATION  
PERSONNEL EMPLOYED IN VARIOUS AREAS  
OF ACTIVITY 1980/81



TELECOMMUNICATIONS EXPENDITURES FORECAST



## 5. Telecommunications Systems

### 5.1 Introduction

In previous editions of the Annual Review this section presented a summary of information pertaining to the shared government telecommunications services managed by the Government Telecommunications Agency (GTA) and analyses of the data provided by departments to an inventory of federal government telecommunications systems maintained by GTA. Activities regarding the provision of shared services have been presented in sub-section on 3.7 of this Appendix and section B.7.

The limited response from departments solicited for input to the inventory prevents the display of meaningful data concerning federal government activities during 1980/81. Table 1 illustrates that the overall departmental response to the annual request for data pertaining to telecommunications systems has been declining since 1978/79.

TABLE 1  
REPORTING HISTORY  
TELECOMMUNICATIONS SYSTEMS INVENTORY

<u>Reporting Year</u>	<u>Departments Solicited for Input</u>	<u>Respondent Departments</u>
1976/77	53	36
1977/78	53	41
1978/79	52	35
1979/80	52	30
1980/81	59	26

A notable fact which the table does not reveal is that only 15 departments have consistently responded each year. The existing inventory has not met the prime objective established at its inception and stated in the 1976/77 Annual Review, i.e. that an inventory of federal government telecommunications systems be complete and current.

This section will: briefly describe the key problems inherent in the present inventory; highlight some of the problems with the management of telecommunications; identify the requirements of departments and DOC/GTA which relate to the development and maintenance of current inventories; present DOC/GTA's approach to meet some of the requirements and introduce the concept of a standardized Inventory of Telecommunications Applications (IOTA).



Subsequent editions of the Annual Review will present a status report on DOC/GTA's activities in solving the problems described in sub-section 5.2, a report on departments' activities in responding to the requirements identified in sub-section 5.3 and progress in the development of IOTA until the mechanisms are in place that will permit presentation of meaningful data concerning federal government use of telecommunications.

## 5.2 Problems

The existing inventory is not a useful tool to departments. The reporting criteria and infrequent updating neither reflect nor support the information required by departments in day-to-day operations. Consequently the quantity and quality of data provided by departments have deteriorated to the extent that the inventory is no longer a reliable reference for DOC/GTA.

The present system was developed within a short time frame and lacks the flexibility required to easily accommodate timely updates, additional applications, new services and ad hoc reporting.

The 1979 Report of the Auditor General found that information was not being maintained within departments for effective management of telecommunications. Specifically, departments had not: gathered the information on their needs and utilization for proper planning, monitoring and control; developed cost accounting systems; nor adequately coordinated the planning, utilization and evaluation of telecommunications services. The Auditor General also found that annual reports produced for Treasury Board were often inadequate or incomplete because information on systems and costs could not be readily verified or gathered from departmental records. This obviously accounts for deficiencies illustrated in Table 1.

These and other problems with the management of telecommunications identified by the Auditor General can be solved with a new approach to the development of inventories. These issues are explored in more detail in sub-section 5.6 of this Appendix.

### 5.3 Departmental Requirements

Until the release of Treasury Board's Administrative Policy Manual, Chapter 435 (APM 435), departmental responsibilities in the area of telecommunications were defined in the Guide on Telecommunications Administration. The Auditor General observed that the seven departments audited were not in general complying with the Guide.

Responsibilities have been more clearly delineated in the directives contained in APM 435. Specifically, departments and agencies shall: establish and maintain appropriate levels of internal reporting of costs and expenditures; evaluate and measure performance as an on-going management function; accumulate statistics to adequately inform senior management and, upon request, Treasury Board Canada (TB); and maintain an inventory to ensure that information is available to authorize payments, support planning and analysis requirements and meet reporting requirements.

APM 435 further states that DOC/GTA is available to assist departments in complying with the directives. Sub-sections 5.5 and 5.6 of this Appendix describe DOC/GTA's initial undertakings preparatory to providing their assistance.

### 5.4 DOC/GTA Requirements

DOC/GTA has the responsibility of assisting departments in their management of telecommunications. They are also responsible for ensuring that the development and administration of telecommunications services safeguard, enrich and strengthen the cultural, political, social and economic fabric of Canada.

These dual responsibilities must be undertaken in support of the government-wide telecommunications planning process. To this end, DOC/GTA must assist departments in fulfilling their responsibilities to ensure that adequate information is provided in return to support government-wide planning.

The Auditor General's report found that DOC had not carried out its legislative responsibility to plan and co-ordinate telecommunications services for departments and agencies. Following is a description of one of the projects which have been undertaken to remedy this situation.

### 5.5 DOC/GTA Activities

In last year's Annual Review, it was reported that "DOC is reviewing the data collection and storage methods used to maintain the inventory of telecommunications systems".

During the review process, the recognition of the inter-relationship of departments' and DOC's responsibilities led to the conclusion that a restructuring of the existing inventory system would fall short of the expectations of both factions. High level standardized reporting is required for DOC/GTA to fulfill its responsibilities while lower level recording of information will differ between departments and agencies. An inventory should be a tool that supports several levels of management while by its very nature it must be capable of supporting day-to-day operations.

The Auditor General's report found that "departments had not identified the type of information required by management to monitor and evaluate telecommunications services and facilities to ensure that they were acquired and used economically and efficiently".

In order to minimize the efforts of departments in responding to the findings and observations of the Auditor General's report and in implementing the directives and guidelines contained in APM 435, DOC/GTA expanded the scope of the inventory project to encompass the needs of departments by way of satisfying the needs of DOC/GTA.

In July, 1981 DOC/GTA contracted a consulting firm to conduct a needs identification study to determine the information requirements of the telecommunications management process within the federal government to support the planning, monitoring and controlling of telecommunications resources.

The following departments were approached by DOC to solicit their participation in the study; an affirmative response was unanimous.

Environment Canada  
National Energy Board  
Revenue Canada - Customs & Excise

The Department of Communications also participated in the study from the perspective of departmental needs and through GTA to provide inputs pertaining to government-wide planning needs.

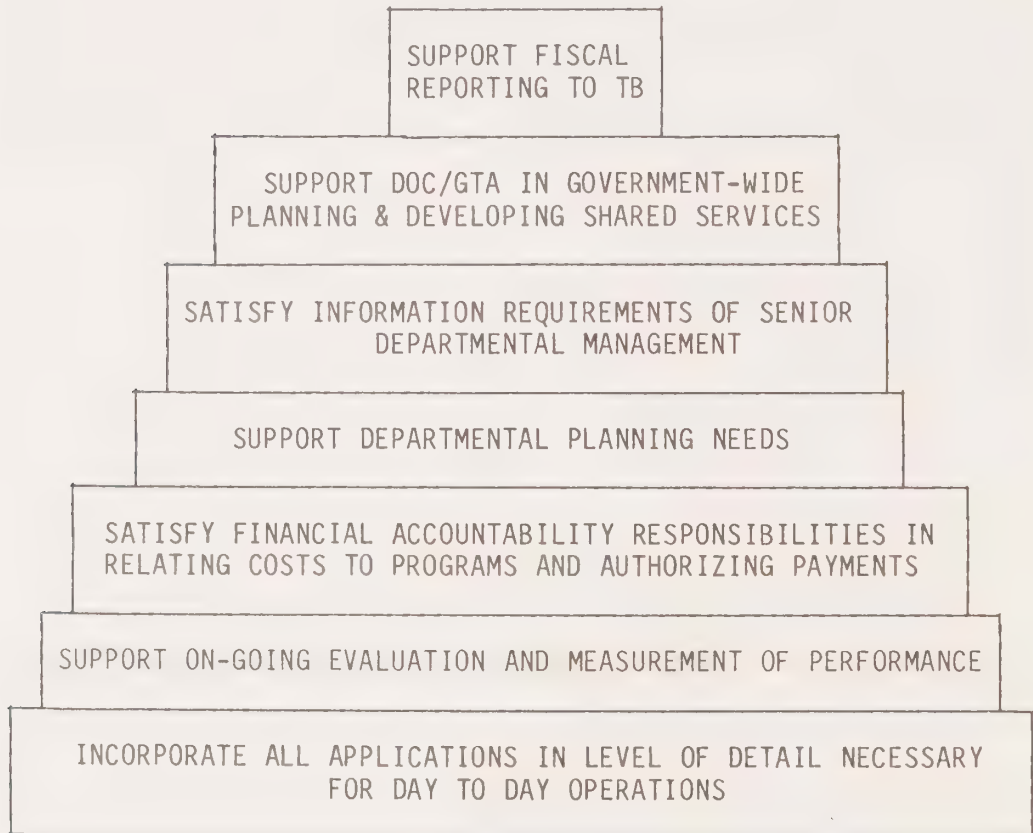
Interviews were conducted with key personnel within these departments to determine information requirements to support the telecommunications management process. The information provided during the interviews is currently being synthesized and analyzed. The resulting analysis will be incorporated in a report to DOC/GTA. Valid observations and recommendations contained within the report will be presented with plans of action in the next edition of this Annual Review.

## 5.6 Inventory of Telecommunications Applications (IOTA)

As stated in sub-section 5.2 and supported by the responsibilities described in sub-sections 5.3 and 5.4, additional problems with the management of telecommunications can be solved with a new approach to the development of inventories.

The preceding section described one of the activities of DOC/GTA in addressing part of the problem with the management of telecommunications. Following are some fundamental requirements of a new approach to the development of inventories.

### INVENTORY REQUIREMENTS



The solution to satisfying these requirements rests within the development of a standardized Inventory of Telecommunications Applications (IOTA). DOC/GTA has commenced the development of a multi-tiered inventory system with the cooperation of pilot departments.

The first level of the inventory will be designed to support departments day-to-day monitoring and control of telecommunications. Subsequent levels will support financial accountability, planning and evaluation. Higher levels of the inventory will support DOC/GTA in government-wide planning and departments' fiscal reporting responsibilities to Treasury Board Canada.

Standard specifications developed in conjunction with the pilot departments will be used to develop departmental inventories. Flexibility will be permitted within the specifications to allow for differences between departments. Built in to the standard specifications will be the high level information requirements of DOC/GTA and TB.

Departments will manage and maintain their own inventories and will be able to meet DOC/GTA's reporting needs mechanically.

IOTA is being developed in accordance with DOC's system development standards. Although target dates are not presently available the project's life cycle will progress through the following stages:

1. Needs Identification
2. Feasibility
3. Functional Definition
4. System Design
5. Programming
6. System Testing
7. Implementation of Pilot System
8. Post-Implementation Review
9. Integration with departments

The milestones in the evolution of IOTA will be documented in subsequent issues of this Review.





## APPENDIX 2

### Analysis of Departmental Plans

#### 1. General Remarks

This appendix analyzes the contents of Annual Telecommunications Reports and Plans submitted to Treasury Board Canada in 1981, with the exception of the past year expenditure and personnel data analyzed in Appendix 1. The material covered here includes the report on past year activities, five year plans, and feedback on topics such as quality and adequacy of service and annual reporting requirements.

Of the 59 departments and agencies required to submit the Report and Plan, 24 (40%) did so, 32 (54%) did not submit plans and three made no return. The 32 organizations which did not submit plans comprised 13 which completed the tables and provided some narrative on matters other than plans, and 19 which submitted tables only. In the latter case the tables completed were generally those relating to past year, rather than planned expenditures. None of the organizations which met the June 30 reporting deadline (14% of the total) submitted plans. These results show an overall deterioration in response over the previous year.

On the other hand, the calibre of response from some major departments and agencies improved substantially, and the number of submissions of plans increased slightly. Twenty-four organizations (40% of the total) reported telecommunications expenditures of more than \$1 million for fiscal 1980/81. Of these, 12 (50%) submitted substantive plans (i.e. showed evidence of serious effort and an understanding of the issues), four submitted nominal planning information, and the remainder did not report plans in their submissions. Two departments whose expenditures exceed \$1 million per annum did not submit the Report and Plan.

These results should not be construed as evidence that plans are not being formulated in the majority of departments and agencies. This may indeed be the case, but a number of important known initiatives were not reported. It is likely that this happens in part because Telecommunications Coordinators are often unaware of the extent of communications systems planning in their respective organizations, and/or are not in a position to gather the required information. Apparently there remains much to be done to impress upon senior executives the need for telecommunications to be managed professionally. Only a handful of organizations report progress towards establishing the integrated information management structures which would make this possible.

Given the deficiencies in the returns, it is still not possible to present a fully reliable profile of planned developments. Enough information is however available to depart from the detail of earlier analyses and concentrate on general features. The most significant of these are:

Authority to Purchase:

- In most organizations authority to purchase telecommunications equipment and services is vested in a number of individuals, some of whom are of junior rank.

Planning Approach:

- Several organizations have been or are now formalizing a long range planning process. The RCMP is notable for having integrated telecommunications planning into the Multi-Year Operational Planning (MYOP) Process. A couple of departments are committed to the development of a coherent telecommunications strategy for the 1980's. Employment and Immigration and Indian and Northern Affairs stand out.
- A handful of organizations report the establishment of interdisciplinary committees to plan and manage communications systems. Notable are Employment and Immigration and Transport.
- Six major user departments report the establishment of an office automation task force to study requirements and recommend solutions. These include Agriculture, Defence, Employment and Immigration, Indian and Northern Affairs and Transport.
- The four largest user departments (Defence, RCMP, Employment and Immigration and Transport), plus Indian and Northern Affairs, all report plans to integrate in-house communications networks during the five-year period, starting in most cases with integration of data networks.
- Service improvement is the most common objective of plans reported. For the first time federal policies of improving service to the public and access to information are accounted for as significant factors in communications systems planning.

Five departments (Employment and Immigration, External Affairs, Health and Welfare, Customs and Excise and Supply and Services) report major increases in communications budgets to provide national toll-free service to the public in accordance with the Cabinet decision of 1980. These increases range from \$136,000 per annum for Customs through approximately half a million dollars per annum for External Affairs and Supply and Services to \$1.26 million and four person-years in the case of the Income

Security Branch of Health and Welfare. Nine other departments committed to providing toll-free access to their services did not account for this factor explicitly in their plans. The sums involved are not trivial, and may be a target for cost cutting once more flexible, lower cost alternatives for interactive communication with the public than the telephone are available and practical.

In keeping with the increased emphasis on simplifying public access to government information, several departments and agencies are automating records management systems and/or library components. Agriculture, Employment and Immigration, Indian and Northern Affairs, the National Library, the Northern Pipeline Agency and the Public Archives all reported initiatives in this area.

- Cost reduction is the other principle justification for plans to increase telecommunications expenditures substantially. Expenditures are planned for equipment and services which will cut overall operating costs. It is noteworthy that forecast expenditures did not show the impact of cost reduction through the acquisition of terminal attachment devices, even though in U.S. government experience communications costs fell by 30% after interconnect was approved.
- The majority of respondents are still extrapolating user needs, budgetary and person-year requirements from current experience. This is not true of the largest departments.
- A number of feasibility studies and pilot tests of new electronic communications systems are under way or planned. Some of these are the object of applications for funding under the DOC Office Communications Systems Program. The most frequently reported tests are of communicating word processor links (eight departments), other forms of electronic mail (five) and PBX/PABX/EPABX-based local area networks (four departments). Other test subjects reported are satellite communications, facsimile and micrographics. Two departments (Agriculture and Customs & Excise) reported that they are developing executive support systems for scheduling and automated access to data bases and briefing materials.

#### Overall Review:

- Of the dozen departments and agencies which submitted substantive plans, approximately half had recently completed or were about to launch an overall review of telecommunications services and equipment. The initiatives of Revenue Canada Taxation are of particular interest. (See Appendix 4.1). Most other departments did not answer this question.

Sharable Resources:

- No sharable resources of any consequence were identified.

Assessment of Services:

- GTA and common carrier services were reported satisfactory overall, but a number of departments commented that the Agency should provide more leadership and direction to its clients. Specific problems and concerns have been passed to the Agency for action.

Annual Reporting Requirements:

- A half dozen large departments and one smaller commented that they found it difficult to complete the Report and Plan. Judging from the fact that 85% of the respondents missed the submission deadline, this is probably quite a conservative figure. Two of the above respondents reported that the requirements were too complex, and three observed that the Telecommunications Report and Plan should be merged with the EDP Report and Plan as soon as possible. On the other hand, several suggested that the difficulty lay in the absence of appropriate interdisciplinary committees to develop, implement and report telecommunications plans.

Usefulness of the Annual Review as a Tool for Planning:

- A majority of departments with substantive plans reported that the Annual Review was helpful in the development of telecommunications plans. In particular, the analysis of department plans was appreciated because it provides a benchmark against which departments can measure their own work.

Interconnect:

- Most respondents indicated they were unsure of the eventual impact of the CRTC interim decision on their communications systems, and several reported that they would be refraining from acquiring terminal attachment devices until digital switching is introduced in the government network in 1983/84. However, eight departments reported that they were purchasing or leasing PBX-type equipment. In the case of Agriculture, which will have installed 14 switches by 1985/86, the objective is to control costs.



## 2. Planned Expenditures by Category

Departments and agencies were asked to forecast expenditures by type of demand for the current and four succeeding years. Seventeen respondents, among them some major users, provided either partial or no data and a majority of the remainder forecast a constant rate of increase in expenditure. Thus the aggregate forecast cannot be considered reliable. Nonetheless, it represents the best information now available on spending intentions and is therefore included in this analysis. However deficient, this forecast will provide a basis for comparison with future, more informed estimates and enable improvements in the quality of planning to be monitored.

The forecast data presented here cover facility-based expenditures (i.e. exclude personnel costs) and are adjusted to be comparable from year to year. The figures are not estimates of total future federal government expenditures by type of demand for the reason stated above.

Note that the six categories used in previous reports have been consolidated into three. For this reason and because these expenditure forecasts are based on total operating and capital costs rather than isolated projects, comparison with forecasts in previous analyses is not particularly informative.

VOICE

80/81	81/82	82/83	83/84	84/85	85/86
\$000					
110,176	117,877	133,830	145,996	154,930	166,806

Of the 56 respondents, 11 provided no data and three provided incomplete data. The majority (26) of the remainder forecast a constant increase in expenditure at the 10%, 15% or 20% level. Customs and Excise was an exception with a forecast decrease of 22% and 27% in the last two years of the period.

As in previous reports, voice expenditures predominate throughout the period, remaining about 260% of forecast data/message communications expenditures through 1983/84 and 225% of data/message in 1984/85 and 1985/86. Total reported expenditures for the five year period 1981/82 - 1985/86 are an estimated \$719,439,000. The size of the difference between forecast voice and data/message communications costs during the latter part of the period is at variance with industry forecasts of a migration from telephone to message traffic.

A significant portion of total forecast expenditures is accounted for by operational radio communications systems planned by the RCMP and Customs and Excise. These departments report plans to spend \$54.7 million and \$11.4 million respectively over the five year period on radio networks.

Telephone-related expenditures are accounted for in part by reported plans to extend nationwide toll-free service to the public and by investment in digital switches. Upgrades to telephone systems are planned in departments such as Correctional Services, Employment and Immigration, Indian and Northern Affairs, Supply and Services, Taxation and Transport.

Two departments (the Correctional Service and the Ministry of State for Economic Development) report that they are using voice teleconferencing regularly for meetings between headquarters and regions and are pleased with the results. The actual number of users is considerably higher.

No use of "voice mail" services was reported, although these are known to be in use on an experimental basis.

DATA/MESSAGE

80/81	81/82	82/83	83/84	84/85	85/86
\$000					
42,860	45,782	51,702	63,001	68,506	74,670

Of the 56 respondents, nine provided no data and two provided incomplete data. The majority of the remainder forecast uneven rates of increase in expenditure. In the few cases in which large increases were reported they related to the introduction or expansion of major systems such as the National Library bibliographic network. In these cases expenditures were expected to remain at the higher level after the initial capital expenditure. External Affairs was the only respondent to foresee a decrease in expenditures, and this was minor (.6% and .3% in 1982/83 and 83/84 respectively). Total reported forecast expenditures for the five year period 1981/82 - 1985/86 are an estimated \$303,661,000.

Three departments (Agriculture, Employment and Immigration and Transport) report that they are decentralizing financial and administrative functions, with a consequent increase in data communications costs in the regions. Other increases are attributable to expansion and upgrading of computer networks such as the Customs Laboratory Information Network for Data Acquisition (LINDA), the EIC Metropolitan Order Processing System (MOPS) and the National Library DOBIS system; to the design and implementation of new on-line systems such as the Excise Client Profile System and the Customs ALERT System for document processing and storage; and to the forecast rapid development of electronic mail and messaging systems.

The systems development plans generally call for the extension of existing and new on-line systems across the country by the mid decade.

As for electronic messaging, 12 departments and agencies report innovations introduced or planned through the use of communicating word processors. Most of these organizations are in the process of linking their word processors.

IMAGE/VIDEO/OTHER

80/81	81/82	82/83	83/84	84/85	85/86
\$000					
3,217	4,260	4,869	6,353	6,925	7,832

Of the 56 respondents, eight provided no data and two provided incomplete data. All but one of these ten reported no expenditures in this category in 1980/81. Another 14 departments and agencies who reported no expenditure for 1980/81 forecast that the status quo would be maintained throughout the period. These results do not stand up to close scrutiny; one department known to have facsimile equipment in place and to regard facsimile as a key component of its office automation system reported zero expenditures in this category for the past year and five future years.

Reported actual and forecast expenditures in this category are consistently about one tenth those for data/message communications. The total reported for the five year period 1981/1982 - 1985/86 is an estimated \$30,239,000.

Nine departments reported the use of facsimile, of which five were expanding the service or upgrading it from analog to digital. External Affairs reported plans to expand installations of secure facsimile and/or secure word processors in 1982/83, having found existing installations highly effective.

Indian and Northern Affairs expected a \$150,000 annual saving in communications costs after mid 1981, in part by switching from analog to digital facsimile in Headquarters and all regions.

3. Planned Expenditures by Year

The actual and forecast figures presented above by category of demand are totalled below by year and compared to figures derived from regression analysis and an expansion to the universe of federal government organizations.

TOTAL ANNUAL FACILITY-BASED EXPENDITURES

	80/81	81/82	82/83	83/84	84/85	85/86
	\$000					
COMPARABLE TOTAL	156,253	167,919	190,401	215,350	230,361	249,308
ACTUAL*	287,015					
REGRESSION*		340,712	386,031	437,438	495,763	561,946

\* Total federal government

Actual expenditures for 1980/81 shown opposite "Comparable Total" are 60% of the actual for the federal government reported in Appendix 1. The forecast derived from departmental returns shows expenditures rising in 1982/83 and 1983/84 at about the same rate as that predicted by regression analysis, namely 13%.

Taking into account a lower rate of increase forecast by departments for 1981/82, this means that the departmental figures cover about 50% of the regression-based figures in 1982/83 and 1983/84. Since these results are more or less consistent with the ratio of actual to reported 1980/81 costs, the regression-based forecast can be viewed with confidence through 1984. Thereafter the forecast ratio of reported to regression-based costs changes because departments estimate a lower rate of increase in cost. At this point data are too incomplete to discount the results of either forecasting method.





## APPENDIX 3

### Case Study in Designing an Organization for Office Communications Systems Development

This describes an organizational concept being applied in Employment and Immigration and in the Health Protection Branch of National Health and Welfare. The approach is designed to establish a focal point for the planning, development and control of network-based communications systems.

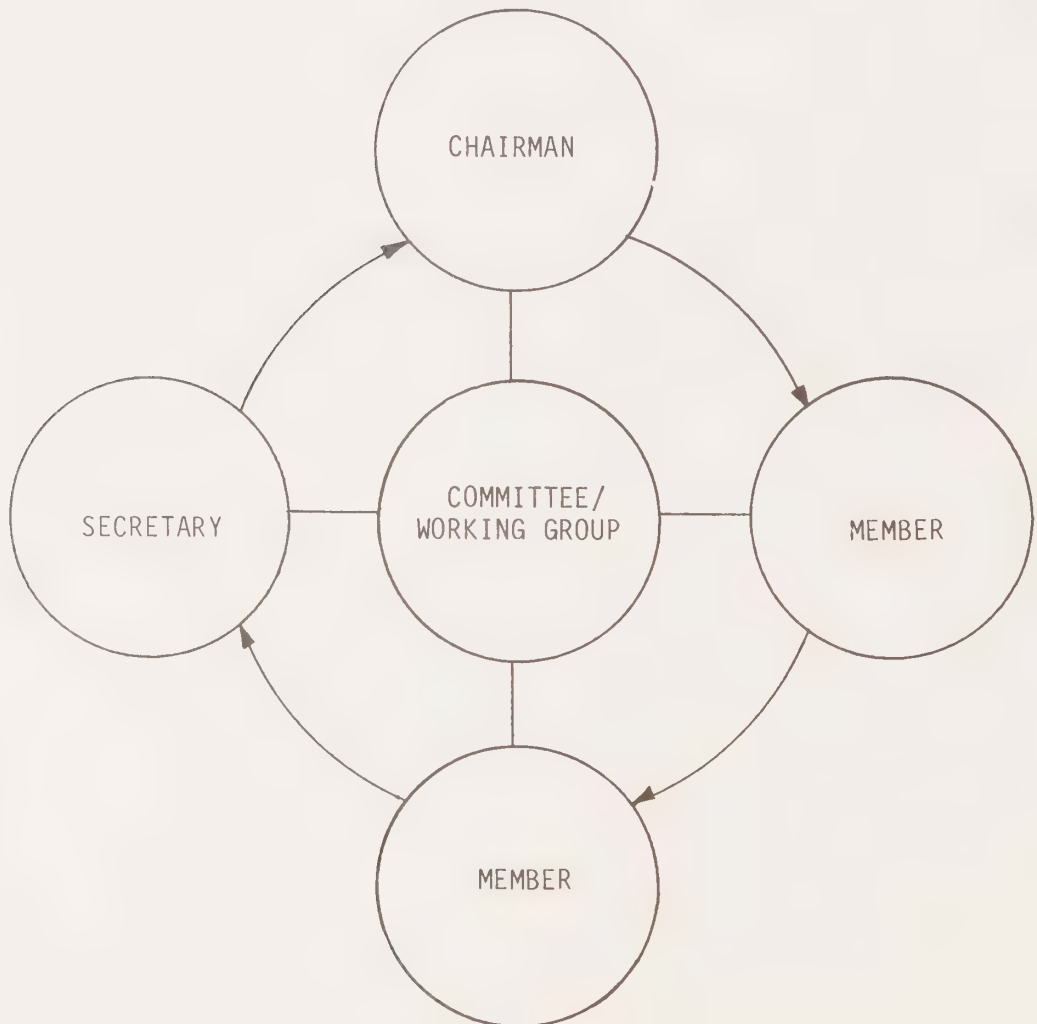
An important feature of the approach is that participants in the development work are provided with terminals with which to communicate with each other. This is in recognition of the need for close collaboration between a variety of professional groups who may have little experience in working with each other. It also gives participants very practical experience in the use of innovative communications technologies. The approach is as follows:

#### Office Automation Research and Steering Committee Network

Terms of Reference - An Office Automation Research and Steering (OARS) Committee network is proposed as the vehicle for the development, implementation and operation of office communications systems in federal departments. Two committees are required at the hub of the network: one to control (define policy, provide overall direction, ensure long term financial viability), and one to guide development and operations.

The Automation Management Programs (AMP) Committee is established at the executive (Assistant Deputy Minister or Director General) level with a scope encompassing data, text and word processing, records management and human resources development. This Committee provides executive authority for the office automation program. Representatives of outside organizations and agencies such as the Office Communications Systems Program, Treasury Board, the Public Service Commission and the unions are invited from time to time, as appropriate.

To distribute the workload and contribute to management development, the roles of chairman and secretary are rotated every 6-8 weeks in this and all other groups. For the sake of continuity the rotation is from secretary to chairman to member, as shown below.

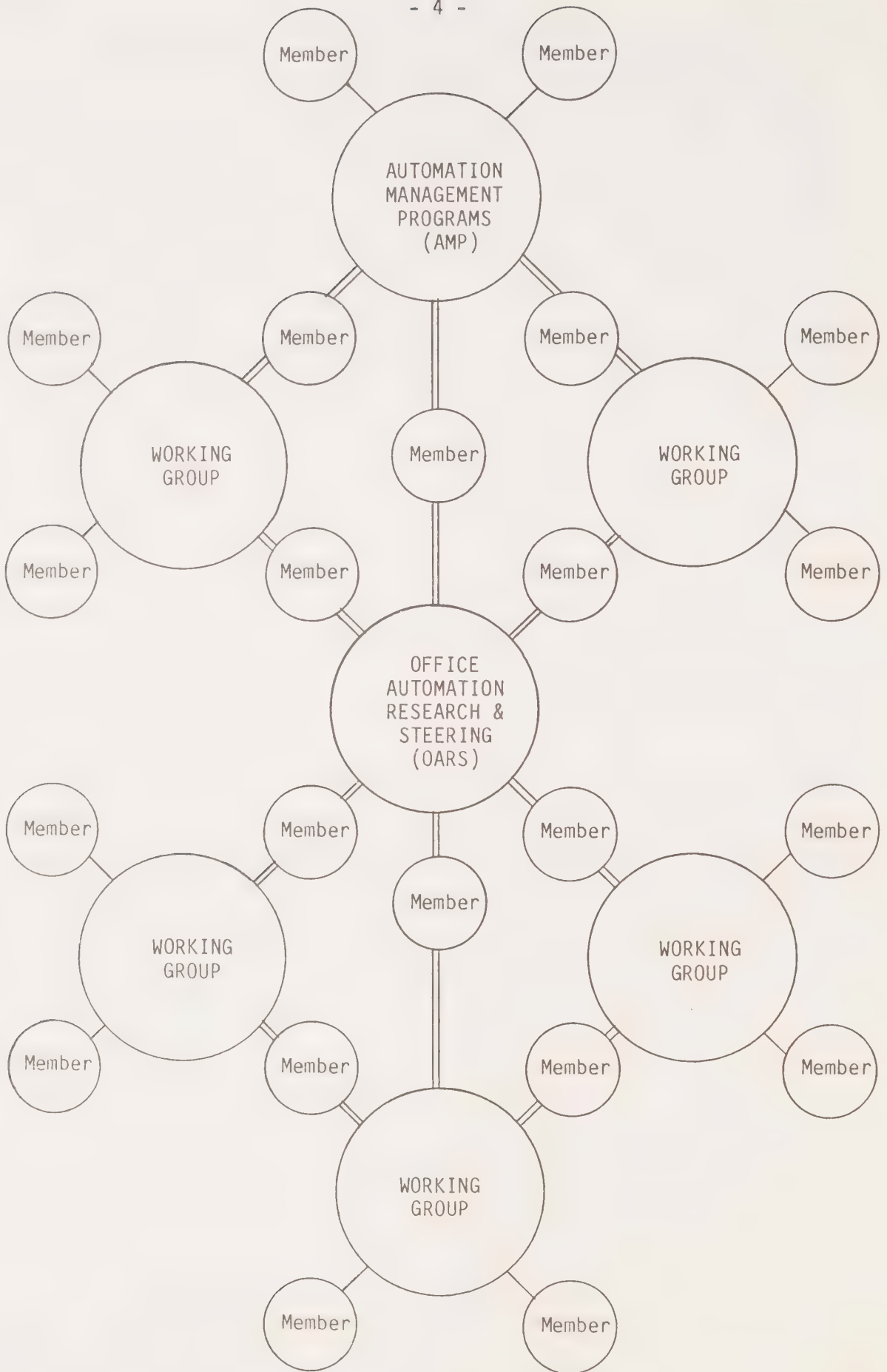


An Office Automation Research and Steering (OARS) Committee consisting of one representative from each group orchestrates the working groups. The OARS Committee is the forum in which a unified approach to office automation is developed. Issues on its agenda relate to policy and planning, people, applications and technology.

Working groups drawing on a range of specialist expertise address at least the issues enumerated below. The number of groups could be as high as eight, depending on the size of the department and the scope of the projects.

1. Automation Technology Development - provides an overall automation perspective for the development work.
2. Automation Network Development - deals specifically with network development requirements. In Health and Welfare the focus is on local area network development.
3. Task and Application Planning - identifies and develops applications, starting with text processing and records and mail management.
4. Automation Skills Development - identifies new skill requirements and plans how they are to be met. Membership includes union representation.
5. Job Enrichment Development - identifies and acts on opportunities for job enrichment through automation.

The working groups are integrated progressively, as key participants take on membership in multiple groups. This enables an appropriate level of communication to be established and insight to be gained into needs beyond those of the immediate organization. This in turn promotes the development of generalist management capability and ensures that automation issues will be better understood as they arise. The integration process is the first step towards a unified office communications network. Once completely integrated, the OARS Committee would look something like this:





The second step towards establishing the unified office communications network can be undertaken concurrently. This is to provide each participant with a terminal with which to communicate with other participants and do development work. Up to an hour per day is assigned to this activity out of the time saved by using the terminal as a conference support device, electronic mailbox, word processor, automated file and management tool. The result is a hands-on approach to network development and a built-in mechanism for promoting participation.

The Health Protection Branch of Health and Welfare is proceeding with this second step by establishing a local area network at Headquarters which will subsequently be extended to offices of the Branch across the country.



## APPENDIX 4

### Policy Issues: Case Studies

#### 4.1 Revenue Canada - Taxation

Following the Auditor General's Report which pointed out the rapidly escalating cost of telecommunications in the federal government, Revenue Canada - Taxation (RC-T) decided to examine its operation with a view to reducing telecommunications expenditures and to study the impact of the interim decision on Interconnect by the CRTC.

As a result, two studies were initiated in the Department. The first looked at the feasibility of converting from ZENITH service to INWATS while the second addressed the cost of providing the best service at the least cost to support functional requirements. Recommendations of both studies indicated that substantial savings and better service were attainable and certain specific recommendations were made in this regard.

With consulting assistance from GTA a pilot test in four District Offices was conducted and evaluated to assess the practicability of conversion from ZENITH to INWATS. It was determined that significant savings could indeed be realized with only minor changes to the existing modus operandi while maintaining the same level of service to the public. The conversion is now being implemented nationally within RC-T.

Also with consulting assistance from GTA and in collaboration with the Information Systems Division of Treasury Board, a second pilot test was initiated in several District Offices and part of Head Office to develop ways and means of implementing the recommendations of the Study to reduce costs and improve basic telecommunications services through cost analyses, reconfigurations, internal audits, traffic analyses and the introduction of newly developed technology.

The acronym for these combined pilot projects is TECA (Telecommunications Cost Analysis) and the project team reports to and receives functional direction from a Steering Committee composed of senior level personnel from RC-T, SSC, TB and GTA. At this stage, the primary or short term goal is to realize economies by increasing the effectiveness of existing systems and operations specifically with respect to voice services. The secondary, and longer term thrust is intended to test the viability of the interconnect option in several District Offices and to determine its cost effectiveness in relation to telco provided services.

Several problems which require attention have already been identified with respect to enhancing the existing telecommunications structure and in planning for the future. They include:

1. The new technology push by independent suppliers.
2. The absence of a federal policy on interconnect.
3. The danger of interconnect equipment proliferation of various types and reliability across the country, raising the problems of standards and compatibility.
4. The question of when and where telco consolidated services such as DMS will be available; what specifications will be provided; what will be the cost; the critical question of course is 'do we wait'.
5. The lack of well defined federal acquisition policies and procedures.
6. The need for revision of the memo of understanding between DOC and DSS and the standardization of procurement strategy by the federal government as it relates to telecommunications.
7. The urgency of supplying administrative and operational management with policy, procedures, standards and guidelines in the form of Telecommunications Manuals to assist them in the effective use of telecommunications resources to provide the required service in support of functional requirements.
8. The necessity for development and training of resources with the necessary expertise and skills to ensure the sound management of telecommunications services within the federal government and to permit the introduction of interconnect equipment as required.
9. The requirement for an organizational entity at Head Office level which would address the entire spectrum of Information Systems and Technology within the Department with particular emphasis on automated office equipment and telecommunications.
10. The classification and staffing of a senior position to head up the Information Systems and Technology Division followed by the identification and classification of other positions to satisfy the specialized resource requirement.

The findings of the TECA Pilot operation will be used in the assessment of interconnect viability at RC-T as well as to determine the extent to which reconfiguration in the interest of economy should be undertaken across the country. It is expected

that a firm recommendation on the latter will be made before the end of the third quarter in 1981. With regard to 'interconnect' and its possibilities, no firm decision will be possible until the performance of interconnect equipment to be installed in representative test sites in early 1982 can be evaluated and assessed. This is not expected to take place before the third quarter of 1982 at the earliest.

As a result of findings and investigation to date the following conclusions have been reached:

1. Pilot projects in representative test sites are essential to test the practicability of study recommendations before full implementation is undertaken.
2. A departmental manual of Policy, Directives, Guidelines, Standards and Administrative Practices and Procedures is necessary as a working tool and resource document in the interest of effective departmental telecommunications. This, in turn, will permit internal and management audit and evaluation functions to be introduced in the interest of operational effectiveness.
3. Acquisition of 'interconnect' equipment should be approached slowly and cautiously with due regard to the complexities and problems which must be addressed and resolved with its introduction. This does not mean that the end result is not worth the effort. All indications point to the realization of substantial savings provided acquisition is well thought out, orderly and coordinated.
4. The advent of advanced telecommunications technology and the virtual end of the telco monopoly and control over the equipment used to furnish customer service heralds the need for an additional resource commitment in the form of training programs which will develop that new expertise and knowledge in human resources.
5. As a central coordinating agency GTA must provide more assistance to other government departments and agencies in such housekeeping activities as costing, forecasting, traffic analysis, information dissemination, administrative practices etc., and must go to the field to develop specifications and to provide services which reflect the needs of the functional user. In addition, GTA must take the lead in clearly enunciating its short and long term plans and to provide good consultative service in these areas.

The kind of activity in progress at Revenue Canada - Taxation at the present time is essential not only to realize a reduction in current expenditures on telecommunications but also for an organization to move economically and effectively toward full office automation.



#### 4.2 Employment and Immigration Commission

The recent technological explosion in the field of telecommunications and the CRTC interconnect decision have resulted in some vanguard activities in the area of telecommunications support to programs within CEIC. In their Annual Telecommunications Report & Plan, CEIC documented that "the use of a common digital medium for computing and communications and unified planning of office communications systems promises savings greater than those achieved in the 1970's through the use of EDP, and will halt the rapid growth of office and telecommunications costs."

CEIC has made a commitment to proceed with office automation. The test components of the office automation plan were chosen on the basis of their potential to:

- . introduce innovative technologies and applications;
- . employ "hard" technology, i.e. equipment available now, since it is essential to remain fully operational;
- . employ Canadian products and services;
- . exploit the savings inherent in the convergence of technologies: i.e. computing and communications

Some of the important office automation issues which have been identified by CEIC include:

- . the requirement for a 5 year plan;
- . management commitment is a prerequisite;
- . the potential savings in time and money are much higher for management than for support staff;
- . the management, non-unionized working environment provides an opportunity to alleviate union concerns while gaining experience;
- . the necessity to establish an inventory of present skills and anticipated skills requirements to ensure availability of expertise;
- . the use of Computer Aided Learning as an important learning tool;
- . the reduction of routine work will require the identification of more productive activities to fill time (e.g. reallocation of time, broader responsibilities, training to develop individuals' career paths.

The Employment and Immigration Commission is proceeding to study and implement office automation and has expressed willingness to share the results with other interested departments.

#### 4.3 DOC Field Trial - Communicating Word Processors (CWP)

In the fall of 1980 a DOC CWP Network Pilot Trial Project Team composed of headquarters and regional representatives was established to conduct the pilot trial. The general objective of the pilot is to gain experience in the planning, operation and evaluation of electronic text messaging systems for introduction by user departments and by GTA as a government-wide shared network.

The first or preparatory phase of the pilot was composed of three stages: 1) Pre-test (to determine level of usage and mode of usage), 2) Operational and 3) Post-test. To ensure proper use of the pilot network, the project team developed both User and Operator Manuals and regularly sent out Information Bulletins. In addition, at least one region has developed a local supplement with more detailed instructions for users within that region.

The project is designed to evaluate:

1. Cost justification of document transmission (personal messaging will be examined at a later date);
2. Productivity: both quantitative and intangible;
3. User acceptance: degree of penetration (percentage of potential users) and replacement of existing mode;
4. Human attitude regarding electronic mail; and
5. Other impacts such as organizational design and correlation to electronic filing.

As a result of findings and experiences to date, the following statements may be made:

1. The GTA IX network is adequate to support office communication systems (up to 2400 bps). The blocking probability is no more relevant with respect to the IX network than it is to a commercial network.
2. Benefits are maximized if communication occurs during non-peak hours (peak hours for the IX network are 10 am to 12 noon and 3-4 pm). No extra circuits are required and, therefore, there is no additional cost to government if usage is concentrated in non-peak hours. With this in mind, departments may wish to consider the benefits of unattended mode (i.e. does not require the presence of an operator) when purchasing equipment.
3. The preliminary evaluation of the CWP network indicates that communicating via the government shared IX network is cost effective. To ensure this, users should have sufficient text editing requirements to justify the cost of the word processor and operator.
4. The statement in 3 above is not to say that the cost of adding communications capability cannot be justified without the previous justification of the word processor itself. There are organizational needs and intangible benefits which may justify the acquisition.
5. While it is generally cost-effective to add a communications package to an existing word processor, the justification becomes somewhat more difficult in the case of adding it to a second or third word processor at the same location. That is, if H.Q. has four word processors and each regional office has four, in most cases it will be cost-effective to add communications to one word processor at each location. A method for cost-benefit analysis of a second or third at one or more locations is being investigated.
6. In terms of organizational structure, there is a shift in workload from support staff to the operator positions.
7. The implementation of a CWP further enhances benefits to the organization in the area of office automation in that a correlation exists between it and electronic filing. It represents the first step toward electronic filing as documents can be stored on diskette.

A pilot trial report can be made available to interested departments. Copies may be obtained from GTA's Development and Engineering Division.

## APPENDIX 5

### Principles for Conducting Pilot Projects

This section outlines 10 principles for the conduct of pilot projects for telecommunications/information technology/office automation applications. While the points listed under each principle are not exhaustive, they will provide stimulus and direction for the identification of important considerations for individual departments and agencies.

#### Advantages of the Pilot Approach

- teaches about office automation through actual experience in a controlled and limited environment
- refines concepts and paper definition of office processes/activities
- assists the determination of what people really need
- generates acceptance through knowledge and understanding
- introduces change and innovation on a manageable scale, in all aspects - human dimension, cost, technology
- demonstrates success - it works

#### Principles

- Principle Number 1: Corporate Objectives
- Principle Number 2: Conceptualization
- Principle Number 3: Commitment
- Principle Number 4: Correlation
- Principle Number 5: Calculate Costs
- Principle Number 6: Core Group
- Principle Number 7: Control
- Principle Number 8: Conduct
- Principle Number 9: Critique
- Principle Number 10: Conclusion

1. Corporate Objectives

- . define plans and strategic objectives of the department/branch/organization
- . set up a pilot project task force/team

2. Conceptualization

- . define the goal in acquiring technology in general terms and relate to overall strategic objectives
- . delineate what the technology is meant to do
  - e.g. - facilitate information flow/exchange
  - automate a manual system (filing, records management)
- . relate to existing office procedures and functions
- . define expected results and put them in writing
- . relate to existing automated functions or developmental plans (if any) within the organization

3. Commitment

- . obtain the commitment and approval of senior management
- . brief management before and during conduct of pilot to maintain confidence and ensure understanding (avoid blocking which may result from lack of information)

4. Correlation

- . choose an area which represents a real business or organizational need
- . if project is merely a peripheral activity there will not be the same commitment to make it work or even if successful, it may not relate to priority needs
- . choose a common organizational process/function in order that potential areas of application are readily available
- . conduct a feasibility study to examine existing procedures/functions/ processes to determine adaptability to automation and eliminate extraneous functions

5. Calculate Costs

- . credibility depends upon an accurate and realistic determination of the costs - no one likes expensive surprises!
- . financial, material, human, time
- . prepare cost statements with benchmarks and periodic cost statements with reference to original estimates
- . consult available expertise (IT&C, DOC/OCS, DSS) re acquisition process
- . rent, don't buy; short term contracts for duration of pilot



## 6. Core Group

- . choose a small group of 12-25
- . choose an existing work unit, if possible, in order to maintain familiarity and reduce unknowns introduced
- . choose good candidates
  - people who presently use similar equipment
  - people who may benefit; i.e. those with an existing problem which the new technology can correct or eliminate
- . ensure people are trained for the new equipment and/or procedures or, if the training/learning curve component is to be evaluated as part of the study, ensure qualified trainers are available and employees understand this aspect of the pilot project

## 7. Control

- . when using new equipment/technology, ensure it will be available and working for the start date
- . utilize existing environment as much as possible
- . keep it simple
- . determine how to measure benefits
  - e.g. . 2 control groups (comparison)
    - . measure before, measure after
    - . interviews
- . set benchmarks and sub-objectives with applicable dates
- . develop contingency plans

## 8. Conduct

- . 2-6 month duration
- . keep it visible
- . allow some flexibility in order that technology, people and procedures may evolve to optimum environment
- . ensure back-up procedures
- . if new equipment/system is not being used, determine the real reason people are not using it
- . allow maximum feedback from users

## 9. Critique

- . compare results of pilot test to stated objectives and expected results
- . identify errors/mistakes/deficiencies and learn from them (for both the technology tested and the conduct of the pilot)
- . answer the question "What did we learn?"
- . demonstrate benefits
- . cost benefit analysis
- . evaluate both tangible and intangible (value-added) benefits

## 10. Conclusion

- . document all results, problems, failures, successes, etc.
- . decision whether to continue with full scale, phased or delayed implementation
- . definition of next stage of development
- . share experience with other departments and agencies via a central agency (GTA) or the Telecommunications Advisory Committee and include a report in the Annual Telecommunications Report & Plan submitted to Treasury Board

## APPENDIX 6

### Reading/Viewing Guide

Periodicals, reports and articles listed in the Reading Guide of the previous edition of the Annual Review are not included here, although they remain highly recommended.

#### General

- . Datamation, "The Feds Discover IRM", June 1981
- . Federal Standard 1037: Glossary of Telecommunication Terms, published by the U.S. Government, General Services Administration Federal Supply Service, 1980.

Provides a comprehensive source of definitions of terms used in telecommunications and directly related fields by international telecommunication specialists. (Copy in DOC Library.)

- . The Impact of Telecommunication on Transportation Demand through the Year 2000, National Transportation Policy Study Commission, Washington, 1978.
- . Serafini, Shirley and Andrieu, Michel, The Information Revolution and its Implications for Canada, Communications Economics Branch, Department of Communications, published by Supply and Services Canada, November 1980, 113 pages.
- . "Telecommunications Advisory Committee Executive Annual Report 1981", Telecommunications Advisory Committee, Ottawa, 1981, 18 pages.
- . The 1981 Telecom Library Catalog, The Telecom Library, 205 W. 19 St., New York, N.Y. 10011, U.S.A. tel. (212) 691-8215.

Covers books, training manuals and seminars, research reports and periodicals on all aspects of telecommunications. Valuable reference. DOC Library has many of the publications listed.

#### Periodicals

- . "Business Communications Review", 36 S. Washington St., Hinsdale, Ill. 60521, U.S.A.

Excellent on management issues. See especially March-April through September-October 1981 issues on "Telecommunications Management" by M.F. Finneran and regular column by R. Frank.

- . "Data Channels," Phillips Publishing Inc., 7315 Wisconsin Ave., No. 1200N, Washington, D.C. 20014, U.S.A.

Published bi-weekly.

- . "The Delta Report", Ted Bates Electronic Publishing International, 790 Bay Street, Toronto M5G 1N9.

Published twice monthly in both paper and electronic form. Excellent perspective on worldwide developments in the communications industry.

- . "Information & Word Processing Report", Geyer-McAllister Publications, Inc., 51 Madison Ave., New York, N.Y. 10010, U.S.A.

Formerly "Word Processing Report". Provides good product information and monthly in-depth product analyses.

- . "Telecommunications", 610 Washington St., Dedham, Mass. 02026, U.S.A.

See especially July 1981 issue, in which articles included "Office Automation", "The Changing Market for Business Communications Systems", "Telecommunications in the Electronic Office", and "Cornerstone of the Multifunctional Work Station - Electronic Mail".

#### Information Providers

- . Euronet DIANE Directory 1981, Euronet DIANE, 15, av. de la Faiencerie, Luxembourg.

#### Networks

- . DELTAK Inc. Videocassettes, Resource 5: User and Management Perspectives, Series 80-20X Corporate Network Strategy and 81-40X Communications Satellite Systems.

The series contain three and four tapes respectively, each lasting approximately 45 minutes. Highly recommended for generating awareness. Available through the Informatics Learning Centre, Public Service Commission, tel. 997-5570 at a government rate or direct from DELTAK Inc., Suite 2100, Tower A, Place de Ville, Ottawa K1R 5A3.

- . Joyce, Charles C., "Communications Networks Transfer Information Inside and Out", in "Word Processing and Information Systems", June 1981

Describes different vendor approaches to the local area network market.

- . Word Processing and Information Systems, "Broadband Coaxial Cable Simplifies Wiring Problems", April 1981.

#### Office Automation

- . DELTAK Inc. Videocassettes, Resource 5: User and Management Perspectives, Series 80-71X Office Automation Concepts and 81-71X Office Automation Technologies.

Each series contains three half-hour tapes. Highly recommended for generating awareness. Available through the Informatics Learning Centre, Public Service Commission, tel. 997-5570 at a government rate or direct from DELTAK Inc., Suite 2100, Tower A, Place de Ville, Ottawa K1R 5A3.

- . Federal Office Automation Conference workbook, Washington, November 1980, 1981

Collections of material from the first and second U.S. Federal Office Automation Conference. Includes extracts from Booz, Allen and Hamilton 1980 study of managerial productivity. Binders in DOC Library.

- . Galitz, Wilbert O., Human Factors in Office Automation, Life Office Management Association, Inc. (Georgia, 1980).
- . Guidance on Requirements Analysis for Office Automation Systems, NBS Special Publication 500-72, U.S. Department of Commerce, 1980.

Presents a methodology for determining the feasibility and practicality of introducing or expanding office automation systems. Designed for use by those responsible for productivity improvement, procedural analysis, data processing and office systems. Cost is \$5.70 (CDN). DOC Library has a copy.

- . International Resource Development Inc., The Personal Business Terminal, Norwalk, Conn., 1979.
- . 1981 Office Automation Conference Digest, American Federation of Information Processing Societies, Houston, March 1981.

Collected speeches. Available in DOC Library.

- . Strategic Business Services, Multifunction Workstations and Peripherals, San José, Calif., 1979.
- . Zisman, Michael D., Representation, Specification and Automation of Office Procedures, Ann Arbor, Mich.: University Microfilms International, 1979.



### Regulatory

- . Economic Council of Canada, Reforming Regulation, Supply and Services Canada, Ottawa, 1981, 167 pages.

See Chapter Five: "Telecommunications".

- . Terminal Equipment List: Certified Equipment. Issued by the Telecommunications Regulatory Service, DOC.

### Technology

- . Bolt, Beranek and Newman Inc., Communications Technology Forecast, Springfield, Va., 1979.
- . Data Communications, March 1981, "32 Bit Micros Measure up to Big Tasks".

Describes the capability of the newly announced "micro mainframes".

### University and Government Research

- . Peitchinis, S.G., The Employment Implications of Computers and Telecommunications Technology, University of Calgary for the Department of Communications, Contract No. OST80-00035, April 1981.
- . Seeley, D., Data Banks in Canada: Type, Ownership, Control and Access, Simon Fraser University for the Department of Communications, Contract No. 03SU 36100-0-9536, 1981



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# Annual Review of Telecommunications in the Government of Canada 1981/1982



Government of Canada  
Department of Communications

Gouvernement du Canada  
Ministère des Communications



Canada





ANNUAL REVIEW OF TELECOMMUNICATIONS  
IN THE GOVERNMENT OF CANADA  
1981/1982

PREPARED BY THE

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DEPARTMENT OF COMMUNICATIONS

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Table of Contents

	<u>Page</u>
<b>A. Highlights</b>	1
1. Focus	1
2. Telecommunications Expenditures, Personnel and Systems	1
3. Progress	2
3.1 Policy	2
3.2 Planning	3
4. Key Recommendations	3
 <b>B. Reducing Telecommunications Expenditures</b>	 6
1. General Remarks	6
2. Cost Savings Potential	6
2.1 Planning Mechanisms	6
2.2 Economies of Scale	7
2.3 Management Practices	8
2.4 Central Agencies	10
3. Cost Savings Achievements	11
 <b>C. Telecommunications Expenditures, Personnel and Systems</b>	 13
1. Telecommunications Expenditures and Related Personnel	13
1.1 Introduction	13
1.2 Information Technology & Systems Plan - Procedure & Response	13
1.3 Activities in Progress Directly Affecting ITSP	15
1.4 Financial Section	15
1.5 Government Telecommunications Agency Charges	19
1.6 Forecast of Expenditures and Personnel	21

	<u>Page</u>
2. Telecommunications Systems Review	21
2.1 Inventory of Telecommunications Applications (IOTA)	22
2.2 Government Telecommunications Agency Services	23
Tables	25-30
Graphs	31,32
<b>D. Preface to Long Range Planning Framework</b>	<b>33</b>
1. Introduction	33
2. Office Automation Trends	33
<b>E. Government Objectives and Priorities</b>	<b>36</b>
<b>F. Progress</b>	<b>38</b>
1. Telecommunications Administrative Policy	38
1.1 Telecommunications Management Manual	38
1.2 Common Services Policy	38
1.3 Telecommunications Training Syllabus	38
1.4 New Universal Call Code System	39
2. Planning	39
2.1 Government Telecommunications Development Program	39
2.2 Activities	49
2.3 Analysis of ITSPs	58
2.4 Telecommunications Advisory Committee	63
<b>G. Carriers and Industry</b>	<b>65</b>
1. Carriers' Progress	65
2. Industrial Update	70
2.1 Office Equipment Products	71
2.2 Integrated Information Management Systems	72
<b>H. Environmental Factors</b>	<b>73</b>
1. Regulatory Trends and Standards	73
1.1 Regulatory Trends	73
1.2 Standards	74

	<u>Page</u>
2. Economic Influences	75
3. Social Factors	78
4. Available and Emerging Technologies	80
5. Government Research and Development	91
5.1 Office Communications Systems (OCS)	92
Field Trials	
5.2 Fibre Optics	94
5.3 Satellites	95
5.4 Telidon	96
5.5 Decentralized Bibliographic	96
Communications Network	
5.6 Semi-Conductor Technologies	96
5.7 University Research	97

## **I. Appendices**

### **I Case Studies**

1. Health and Welfare Canada's Policy  
    Re Call Codes
2. Transport Canada's Application of Treasury  
    Board's Telecom Policy

### **II Reading/Viewing Guide**

### **III Calendar of Events**

### **IV Glossary of Abbreviations**





## **A. Highlights**

### **1. Focus**

Recent issues of the Annual Review have been developed as a planning tool which government organizations, including the Department of Communications, can use to shape their proposals for the future. This year, as a prelude to the departmental reporting analysis and the long range planning framework, focus has been centred on potential and achieved accomplishments in reducing telecommunications costs. With the economy struggling to recover from recession, the topic is timely.

The need for strategic and tactical planning, the benefits of economies of scale and ways to tighten management practices are presented; central agencies are alerted to specific areas requiring the development of policies, guidelines and procedures; and, finally, a number of noteworthy cost savings achievements are reviewed.

### **2. Telecommunications Expenditures, Personnel and Systems**

In 1982 Treasury Board replaced the annual Telecommunications Report and Plan with the Information Technology and Systems Plan (ITSP), merging the collection of data from both the telecommunications and EDP disciplines into one reporting format. This has been a significant factor in bringing the two communities together and undoubtedly will result in further benefits through recognition of committee and organization changes.

Total telecommunications expenditures by the 56 out of 63 departments and agencies which reported amounted to almost \$450 million. The 63 departments and agencies comprise all federal Government organizations whose telecommunications expenditures exceed \$20,000 per year. The reported expenditures (which include telecommunications personnel-related expenditures) represent 89.7% of the total telecommunications expenditures of the Government.

The increase of 14.6% over 1980/81 expenditures is slightly below the historical increase recorded at 15-20% and 2.2% lower than the 1980/81 increase. It is composed of a 21.1% rise in operating expenditures, 4.5% reduction in capital expenditures and 10.1% growth in personnel-related expenditures.

The 1981/82 increase in operating expenditures is attributed to the following factors:

- tariff increases
- implementation of new/updated systems in order to improve and establish service required

- increased emphasis on service to the public requiring additional service
- 1981 Census of Canada
- better reporting

Capital expenditures actually decreased in this reporting period, as opposed to an historical growth of 16-25%. This appears to reflect both a wary approach to capital acquisitions pending a clearer definition of the cost benefits of new technology and a decline in equipment costs resulting from the more competitive market produced by terminal attachment regulation changes.

Estimated federal Government telecommunications person-years totalled 7,311, an increase of 2.1% over last year's estimate. Reporting accuracy remains a problem, however. Forecast growth of person-years by departments and agencies is 3.7% for 1982/83, declining to 1.3% in 1986/87.

Efforts by GTA to develop a standardized model for recording and reporting telecommunications systems data are continuing. With the first phase of development of an Inventory of Telecommunications Applications (IOTA) completed, the project has progressed to Phase 2 - a feasibility study.

The Government Telecommunications Agency has expanded its inter-city network to 24 centres and now includes Sudbury, Kingston, Abbotsford and Charlottetown. In 1981/82 telephone terminals accessing consolidations increased by approximately 10%. Extensive activities are now underway to implement digital technology to replace existing facilities.

Expenditure forecasts and other details are provided in Section C.

### **3. Progress**

#### **3.1 Policy**

An update of Government telecommunications administrative policy includes development and distribution of a Telecommunications Management Manual, publication of Treasury Board's APM Chapter 303 - Common Services, GTA's recently-developed Telecommunications Training Syllabus and a proposed new universal call code system. Appendix I presents two departmental case studies - Health and Welfare Canada's policy recall codes and Transport Canada's application of Treasury Board's Telecommunications Policy.

### 3.2 Planning

This year's Annual Review includes comprehensive coverage of a development program for Government telecommunications highlighting voice services, satellite communications, enhanced teleconferencing, electronic messaging, EDP communications, shared data/messaging services and local area networks. In addition, GTA's activities are reported in detail, as are selected departmental activities.

ITSPs show that the number of departments and agencies reporting substantial plans have decreased, but the overall concern with planning has increased significantly. In particular, a deep awareness of and attention to the technological changes are noted. Training needs remain high on the priority list; numerous field trials and feasibility studies are recorded; and perceived policy requirements have been identified.

### 4. Key Recommendations

Government telecommunications planning is being addressed by the Government Telecommunications Agency with emphasis on satisfying the needs of the user with state-of-the-art technology and saving the Government money through economies of scale. The Government's policies on common services and telecommunications both reinforce the requirement for departments and agencies to seek the use of shared services. Critical feedback of reporting requirements as defined by Treasury Board is being addressed in part by a "Reporting Requirements Sub-Group" of an inter-departmental working group on EDP and telecommunications.

Recommendation 1: Increased emphasis must be placed on the need to better inform departments and agencies on government telecommunications planning activities.

Cognizant of the versatility and declining costs of desktop micro systems and the subsequent modifying of word processing equipment more closely to resemble the micros, managers should carefully examine their requirements before purchasing or leasing word processors.

Recommendation 2: Word processors should be acquired for specialized applications only.

Despite the dramatic evolutionary changes taking place, Government organizations should not be unduly influenced into delaying acquisition of equipment on the basis of imminent obsolescence. Hands-on experience with the products offered today will prepare personnel for the level of sophistication that will herald the next generation.

Recommendation 3: Departments and agencies should take advantage of the productivity gains to be achieved through state-of-the-art equipment by carefully considering their needs and following a phased plan.

By more actively advising their organizations in terms of planning and management practices and by widely distributing material of an instructional or informative nature, telecommunications staffs can play a significant part in improving costs, services and procedures.

Recommendation 4: Telecommunications staffs should -

- a) ensure that management practices are tightened in their organizations in accordance with Government policies and Section B 2.3 of this report;
- b) keep senior management and other personnel advised and informed by disseminating pertinent information which will enhance their knowledge, awareness and understanding of telecommunications-related changes pertaining to their needs; and
- c) be instrumental in ensuring that comprehensive telecommunications planning practices are developed and pursued in coordination with the EDP planning of the organization, in accordance with the requirements of Government policies, and with due consideration to Government long range development plans.

In support of departmental planning, office automation implementation and related issues, central agency policies, mechanisms and procedures are urgently required.

Recommendation 5: The requirements outlined in Section B 2.4 and Section F 2.3.6 should be studied by all concerned and actioned by the appropriate authority.



Training and information needs remain urgent and inadequately respected.

- Recommendation 6:
- a) Central agency basic and advanced technical training courses should be developed in the areas of telecommunications and electronic data processing.
  - b) On-the-job information on state-of-the-art technology should be provided to Government departments by a central agency on a periodic basis.
  - c) Up-to-date information on state-of-the-art technology should be provided to Government departments by a central agency on a periodic basis.

## **B. Reducing Telecommunications Expenditures**

### **1. General Remarks**

As 1982 came to a close, restraint measures implemented within the federal Government demanded a sharpening of management practices.

An analysis of Information Technology and Systems Plans (ITSPs), section F 2.3, corroborates that Government telecommunications management planning policies and practices in some departments are being pursued with cost-conscious intensity. As well, a spot examination of telephone expenditures by Treasury Board revealed that most departments with significant telephone expenditures are concentrating on cost control with technical management and consequently telephone expenditures are "not out of control".

Nevertheless, major savings are still possible for the government as a whole and individual departments by developing planning and updating mechanisms and policies, achieving economies of scale through shared services, and tightening management practices.

### **2. Cost Savings Potential**

#### **2.1 Planning Mechanisms**

Planning is conceived from forethought and born of action - not reaction. It walks hand-in-hand with two basic Government goals: efficiency and cost effectiveness.

Effective planning is double-barreled. It consists of a strategic plan, which is concerned with how goals and objectives can be achieved and a tactical plan, that provides the specific measures needed to reach those goals and objectives. As explained by Robert J. Michael of First City Bancorporation in an article in Business Communications Review, "Where strategic planning puts the infra-structure in place, tactical planning follows on to build the superstructure." The strategic plan, that encompasses five-to-ten years, should be reviewed annually, followed by tactical plan adjustments according to the changing impacts of environmental factors.

In developing an organization's telecommunications plan, a planner must

- understand and recognize the corporate objectives of the organization and aim to achieve them;
- be flexible: identify the evolution of change, keep abreast of the changing trends, and adjust accordingly;

- identify functional needs, remembering that technology is not an end in itself, but a means to an end;
- be cognizant of and work in harmony with the goals of the data processing strategic plan of the organization.

## 2.2 Economies of Scale

The cost effectiveness of the shared services/centralized management approach to the provision of telecommunications in the Government has been reinforced by the Common Services Policy issued by Treasury Board in 1982. It is expected that over the next few years, with increased emphasis on sharing and consolidations for maximum net savings, the rate of growth of demand in shared systems will exceed that of the total growth rate for Government telecommunications.

Upgrading of consolidations through technology-based service, as being implemented by GTA (section F 2.1), will offer not only improved station features but modern network services such as dial tandeming and automatic selection of the most economical long distance route. These features will make possible more cost effective telephone configurations, optimized inter-city network routing, a higher proportion of calls originated and answered without operator or secretarial intervention and better control of telecommunications expenditures through complete call detail recording and toll restriction capabilities.

Decentralization of digital switching facilities by individual users would result in small local packets of digitally interconnected office equipment. This approach should be discouraged where needs go beyond the local area network (LAN) configuration. These require many more types of interconnecting data facilities and a focal point for accessing inter-city digital facilities - both costly concerns.

The development of suitable data support capabilities (such as local and inter-city digital trunking, time of day class of service restriction, local data loop up to 56K bps, sub-speech channel multiplexing capability with sub-channel addressing) is being planned.

In recognition that the Government Data Network Service (GDNS) requires updating, GTA is investigating the development of a national shared store and forward message, facsimile and CWP service.

In the interim, an additional shared service is being offered in the form of the Government Electronic Messaging Service (GEMS) which should prove to be cost effective with bulk discounts and help departments move into office automation equipment compatible with the long term plans for Government telecommunications development.

### 2.3 Management Practices

Many of the following observations reflect the need for telecom staffs to be more active in the role of advisor to their organizations. One way is to ensure instructions, letters, etc. are distributed, reproduced, rewritten if necessary for individual departmental needs.

These suggested practices should be considered in compliance with the policies and guidelines of APM 435 and 436:

- Centralized control of the budget for administrative telephone expenditures within a department is desirable to promote efficiency within tariff options and to spot wasteful practices.
- Technical competence within departments should be assured for effective cost control.
- Where departments qualify for exemption of shared services, tendering procedures should be undertaken in the areas where terminal attachment is approved.
- Call codes should be used by no more than five people (preferably one or two) to maximize administrative controls.
- Inter-city calling guides should be carefully read and used. The following routing errors are incurring unnecessary costs:
  - (i) Incorrect use of INWATS service numbers such as the zone 6 number instead of the much less costly zone 3 number.
  - (ii) Use of INWATS when direct lines are available.
  - (iii) Use of user dial OUTWATS when direct lines are available.

- GTA manages dedicated INWATS and OUTWATS groups for several departments and agencies. Through negotiations with TCTS, the Agency is in a position to provide considerable savings in comparison with individual subscriber-controlled WATS groups.
- Personnel should be advised that in the National Capital Region free calling area INWATS service should not be used to access the Government network from a non-Government telephone. Instead, they should dial 996-5432 at no charge at all. This mistake is costing an average of \$6000 monthly.
- As a follow-up to the achievement of consolidated billing, data is being gathered by GTA from certain departments on their leased circuits. Participating departments obtain discount rates for circuits that, independently, would usually be charged at higher rates where they are obtained directly from common carriers.
- Overdue accounts can be a costly, but avoidable, expense. Although not visible to the user, interest costs are incurred on any unpaid balances of the GTA Revolving Fund at the end of each month.
- The Government telephone network should be used for data applications during off-peak hours wherever this is cost-effective.
- Effects of cutbacks in departmental travel budgets may be alleviated through the use of the Government teleconference service. The current technology offers unique opportunities for increased cost effectiveness. While teleconferencing is not advocated as a substitute for all travel, it should be considered as a means of supplementing mandatory travel requirements and enhancing productivity.
- Telex and GDNS users should note that GTA has negotiated a discount rate for heavy volume user terminals.
- Telex directory listings have become increasingly expensive. Although each Telex and GDNS station is entitled to a free listing, bold printing, extra lines and extra listing (for French and English) all cost extra. A circular letter on directories has been developed by GTA to assist departments in reducing costs.



- . To help keep Government of Canada directory costs down, APM 436 directs that listing of personal names in departmental sections should be limited to those essential to the operational function of the organization.
- . Most departments could effect substantial savings in their existing telecom equipment expenditures by re-examining their present configurations. Physical moves and reorganizations should always be accompanied by such evaluations. They should be launched at a high managerial level and are apt to be most effective if carried out in consultation with GTA representatives for the sake of objectivity.
- . Hardware and leased line billing is not always accurate. Managers should make a habit of verifying that the equipment for which they are billed is identical to that which is on their inventories.
- . Abusive use of the Government inter-city network cannot be controlled to the extent of management requirements with the limited equipment in place. However, complete call detail will be available in September 1984 in NCR and elsewhere according to the schedule for enhanced digital consolidations.

#### 2.4 Central Agencies

- . Integrated planning and coordinating mechanisms should be established to
  - (1) develop norms or performance indicators which will allow telecom managers to measure their performance. Simple indicators would include: the actual cost/station vs TBC guideline; number of speakerphones and automatic dialers not used in emergency or operations rooms or in support of handicapped persons; a listing of divisions in descending order of cost/station; long distance cost per employee; etc...
  - (2) develop procedures for the coordinated technical planning by GTA, Public Works and departments; inventory control; quality of service criteria for telephone systems which support the primary interface with the public; etc...
  - (3) deal in an organized way with the various categories of integrated office automation systems.

- (4) interface with inter-departmental committees and Working Groups, e.g. TAC Working Group on Planning.
- (5) streamline the process of ITSP submissions to enhance reporting in the Annual Review.
- . Treasury Board policy should be developed to control entitlements to special purpose telephone equipment such as hands-free telephones, automatic dialers and special intercom systems. Where TB guidelines are exceeded, a requirement for managers to authorize the exception should be established.
- . In line with potential savings in the tendering of Ottawa-Toronto inter-city circuits, competitive bidding procedure studies should be extended to all routes subject to interconnection.

### **3. Cost Savings Achievements**

Within the past year substantial cost savings were initiated through the following activities:

- . A significant achievement was attained in the area of procurement procedures and consolidated billings from common carriers for leased TCTS services. This was based on work initiated by TAC to investigate the potential savings in leased telecommunication expenditures if the Government could act as a single customer rather than a number of organizations acting independently. During the past year, leased TCTS services used by DND, DOE/AES, DSS, Transport Canada and GTA were consolidated under the Telpak account managed by GTA. The transfer of common carrier billings from users to the GTA account became effective April 1, 1982 and will realize about \$1.8 million savings per annum for the Government.
- . Following the decision by the CRTC allowing CNCP Telecommunications to provide telecommunications services by interconnecting with Bell Canada facilities and cognizant of the Government policy of fostering the competitive process in the acquisition of telecommunications goods and services, GTA sought request for proposals from both major carriers to provide the intercity circuits between Ottawa and Toronto. An analysis of the two responses showed the CNCP proposals to be the more cost beneficial and the transfer of circuits from TCTS to CNCP was completed.

- Wide Area Telephone Service (WATS) lines were increased by 55.5 per cent to 1,365 circuits. Used in lieu of more costly methods of communication, WATS usage represents a substantial savings for Government as well as providing a means to satisfy expanding Government information program needs.
- Based on on-going studies within GTA, the estimated aggregate net savings derived by the Government are of the order of 40 per cent as compared with commercial services available directly from the common carriers (e.g., Direct Distance Dialing, Telex).
- For Government of Canada directory purpose, amalgamation of all telephone consolidations within each region was completed in 1981/82 to minimize production costs. The resulting cost benefit indicates substantial savings over the previous year.

Treasury Board initiatives included issuance of administrative practices related to spending controls on Long Distance Telephone Calls (see APM Chapter 436) and the release of a letter on the subject of restraint of Government expenditures (including telecommunications) from the Secretary to Deputy Heads in September, 1982.

## **C. Telecommunications Expenditures, Personnel and Systems**

### **1. Telecommunications Expenditures and Related Personnel**

#### **1.1 Introduction**

This section of the Annual Review deals with telecommunications expenditures and personnel involved in providing telecommunications services within the federal Government of Canada. Under the direction of Treasury Board Canada and with the authority specified in Chapter 435 of the Administration Policy Manual, this information was requested via the telecommunications section of the Information Technology and Systems Plan. All departments and agencies named in Schedules A and B of the Financial Administration Act whose telecommunications expenditures exceeded \$20,000 per year were canvassed. Information for 1981/82 was requested from 63 departments and agencies, an increase of four over 1980/81. The following departments/agencies were requested for the first time to submit telecommunications sections of the Information Technology and Systems Plan: Fitness and Amateur Sports, Social Science and Humanities Research Council, Ministry of State for Social Development and the Tariff Board.

Of the 63 departments requested to submit returns, 56 responded. Analysis of Public Accounts records indicates that the total expenditures reported by the 56 departments represents 89.7% of the total telecommunications expenditures. Data received through these reports have been used to estimate expenditures for the federal Government which appear in the tables and graphs at the end of Section C.

#### **1.2 Information Technology & Systems Plan - Procedure & Response**

##### **1.2.1 Procedure**

In 1982, Treasury Board, Department of Communications and the telecommunications community in general agreed to implement changes to the process used to gather telecommunications resource information. Initial assessment of the environment indicated that as a result of the linkage of telecommunications and EDP technologies, benefits could be derived from inter-relating the telecommunications and EDP annual reports. This was done with the issuance of a combined document identified as the Information Technology and Systems Plan (ITSP). This new report however maintained a distinction between telecommunications and EDP having

each reported in separate sections. The format and specifications of the telecommunications section of the ITSP remained basically unchanged from what was previously the Telecommunications Report and Plan. With the combined request for telecommunications and EDP information came a change in the due date from June 30 to October 31.

It is anticipated that further modification of the format, content and methodology used to gather telecommunications resource information will be implemented in the near future.

As in past years, seminars were held in March, 1982 to familiarize departmental telecommunications personnel with the reporting requirements. Following these seminars, Treasury Board formally issued the Information Technology and Systems Plan to departments for completion by October 31, 1982.

#### 1.2.2 Response

Responses to Treasury Board by the date requested was poor and considerable effort was required to ensure the majority of departments eventually responded. The following table shows the record of receipt.

<u>DATE RECEIVED</u>	<u>% OF TOTAL DEPTS REC'D</u>
Oct. 31/82 (due date)	3.0%
Nov. 31/82	40.6%
Dec. 31/82	53.1%
Jan. 31/83	73.4%
Feb. 28/83	89.0%
NOT RECEIVED	10.9%

Feedback from departmental telecommunications personnel suggests that this slow response was mainly due to the following circumstances:

1. lack of resources to perform the work involved in completing the ITSP; i.e. knowledgeable personnel, automated systems
2. difficulties within the department of collecting telecommunications expenditure and planning information
3. delays in completion of the EDP section extended the time for formal submission of the telecommunications section



### 1.3 Activities in Progress Directly Affecting ITSP

During 1982 an ACIS EDP/Telecom sub-working group was formed with the responsibility of developing recommended reporting requirements for future Information Technology and Systems Plans. This sub-working group is composed of both telecommunications (TAC members) and EDP (ACIS members) from throughout the federal Government and is currently assessing the benefits derived from information submitted in ITSPs. Recommendations concerning future reporting requirements should satisfy the needs of the EDP/Telecom community generally.

In addition, a TAC Working Group responsible for developing telecommunications definitions and expenditure coding continued to make progress. Activities of this Working Group should provide support for managing telecommunications resources. Current activities support the planned approach to an improved federal Government inventory system and changes to the telecom financial coding structure.

In support of Government telecommunications planning functions in general, a TAC Working Group on Planning has recently been established.

### 1.4 Financial Section

#### 1.4.1 Total Telecommunications Expenditures (Refer to Table 1)

Total telecommunications expenditures (including telecommunications personnel related expenditures) for 1981/82, amounted to \$449,686,000, an increase of 14.6% over 1980/81. A more detailed look shows this increase is composed of a 21.1% increase in operating expenditures, 4.5% decrease in capital expenditures and a 10.4% increase in personnel-related expenditures.

Historically total telecommunications expenditures have increased at between 15-20% annually with the 1980/81 increase measuring 16.8%. Total telecommunications expenditures vary significantly in their distribution across departments. Table 3 shows that two departments (National Defence and RCMP) accounted for almost half of the expenditures, whereas the forty smallest departments by expenditure account for only 6.9%

Analysis of all departments reporting total telecommunications expenditures in excess of one million dollars for 1981/82 reveals growth of 12% in their total telecommunications expenditures. The remaining reporting departments measured growth of 20.5% in their total telecommunications expenditures.

1.4.2 Telecommunications Operating Expenditures  
(Refer to Table 1)

Total telecommunications operating expenditures, which constitutes 57.9% of total telecommunications expenditures, increased by 21.1% in 1981/82, slightly higher than the 17.5% increase forecast in the last edition of the Annual Review. Operating expenditures are detailed in Table 1 and from information there it is evident that telephone services from the Common Carriers and from GTA account for the increase of the total operating expenditures.

Total cost for services demanded by departments and agencies through the Government Telecommunications Agency (GTA) increased by 26.7% in 1981/82. The major components of this increase were voice intercity shared services (25%), voice intercity customized services (47.4%) and local voice services (23.1%).

Other components of the GTA billing increased by 23.9% and comprised only 14.3% of the total billing. Therefore, they did not substantially contribute to the overall percentage increase.

The major departments reporting increases in voice telecommunication services from the Common Carriers and GTA are:

- 1) National Defence
- 2) Transport Canada
- 3) Health & Welfare
- 4) Correctional Services
- 5) Statistics Canada
- 6) Public Service Commission
- 7) National Film Board
- 8) Veterans Affairs
- 9) Justice

The increase in these expenditures is attributed to a variety of factors:

- 1) tariff increases
- 2) implementation of new/updated systems in order to improve and establish service required
- 3) relocation or reorganization of departments
- 4) increased emphasis on service to the public requiring additional service
- 5) 1981 Census of Canada
- 6) better reporting

Computer communications services, also a component of operating expenditures, showed a significant increase of 51.6%. Past studies have shown that expenditures related to computer communications services were under-reported. It is therefore concluded that this increase is largely a result of more complete reporting.

Rental expenditures, another component of telecommunications operating expenditures, changed significantly from the previous year. For 1981/82 these expenditures decreased by 31.8%. In 1980/81 new economic objects and related definitions were introduced resulting in confusion within the community regarding rental expenditures and Common Carrier service expenditures. At that time it was felt expenditures belonging in the category of Common Carrier services were being reported under rentals, producing unrealistically high rental expenditures. Therefore, the decrease in the 1981/82 rental expenditure is attributed to better understanding by the community of the financial coding structure.

#### 1.4.3 Total Telecommunications Capital Expenditures (Refer to Table 1)

Total telecommunications capital expenditures for 1981/82 decreased by 4.5% to \$42,100,000. Historically, growth of telecommunications capital expenditures has been between 16 - 25%. The uncharacteristic decline in telecommunications capital expenditures is attributed to conditions that exist within the community. Uncertainty with respect to benefit from terminal attachment has given many in the community a wait and see attitude, thus having the effect of delaying capital acquisitions until a clearer view of appropriate action is established. In addition, departments deciding to acquire telecommunications equipment are tending towards renting/leasing as an alternative to purchasing thus reducing the capital expenditures reported.

Another factor contributing to the decline in capital expenditures relates to new interconnect regulations. Departments which have made capital acquisitions during 1981/82 have found that as a result of competition among terminal attachment companies the cost of equipment has declined.

#### 1.4.4 Telecommunications Personnel and Related Expenditures (Refer to Tables 1, 4 and Graph 1)

Total telecommunications person-years reported for 1981/82 amounted to 7,101. However, when adjusted for departments not reporting, the total estimated telecommunications person-years for

the federal Government amounts to 7,311. This constitutes an increase of 2.1% over last year's estimate. Problems continue to be encountered by departments when attempting to determine their telecommunications person-years and as a result the accuracy of this information remains questionable.

It can be observed from Graph 1 that the distribution of person-years remained similar to that reported in 1980/81.

Telecommunications personnel-related expenditures which, are comprised of salaries, professional and special services, increased in 1981/82 by 10.4% to \$147,436,000. This is due to an increase in professional and special services of 135.5% and an increase in salary expenditures of 9.5%. The increase in professional and special services although dramatic is not significant due to its magnitude. The increase in salary expenditures which is the major component of total personnel expenditures is due to an increase of 2.1% in the number of person-years utilized and an average salary increase per telecommunications person-year of 7.3%.

#### 1.4.5 Shared, Customized and Departmental Services

Analysis of 1978/79 through 1981/82 telecommunications expenditures reveals the following breakdown of expenditures by shared, customized and departmental services.

% of TOTAL			
<u>Voice</u>	<u>Shared</u>	<u>Customized</u>	<u>Departmental</u>
1981/82	45.9%	3.6%	50.5%
1980/81	45.2%	2.6%	52.2%
1979/80	38.3%	3.4%	58.3%
1978/79	42.6%	3.8%	53.6%

<u>Data</u>	<u>Shared</u>	<u>Customized</u>	<u>Departmental</u>
1981/82	8.5%	5.2%	86.3%
1980/81	4.4%	3.1%	92.5%
1979/80	4.4%	3.9%	91.7%
1978/79	3.3%	2.5%	94.2%

## 1.5 Government Telecommunications Agency Charges

### 1.5.1 Charges to Government Departments for Telecommunications Services

1981/82 GTA total billings for services provided to departments increased by 26.7% over 1980/81. This was due to 25% increase in voice intercity shared services, 47.4% increase in voice intercity customized services, 23.1% increase in local voice services, 7.6% increase in intercity message network and 40.2% increase in intercity customized data services. These increases are significantly larger than the historical trend. It is interesting to note that both customized voice services and customized data services have each increased by over 40%. Closer analysis of GTA charges to departments shows that billing increases were spread relatively evenly over all departments.

The following table provides details of GTA billings for the years 1980/81 and 1981/82.

		\$ (000)	% of Total	Increase from previous year
1 9 8 1 / 1 9 8 2	Intercity Shared Services	50,396	70.7%	25.0%
	Intercity Cust. Services	7,345	10.3%	47.4%
	Total Intercity Services	57,741	81.1%	27.5%
	Local Services	3,376	4.7%	23.1%
	Intercity Message Services	4,449	6.2%	7.6%
	Intercity Cust. Data Services	5,762	8.1%	40.2%
	Total Intercity Services	10,211	14.3%	23.9%
	Local Services	*	*	*
	Total Data & Voice Services	71,328	100%	26.7%
	Intercity Shared Services	40,316	71.6%	9.7%
	Intercity Cust. Services	4,983	8.9%	- 7.1%
	Total Intercity Services	45,299	80.5%	7.6%
1 9 8 0 / 1 9 8 1	Local Services	2,742	4.9%	12.4%
	Intercity Message Services	4,135	7.3%	8.6%
	Intercity Cust. Data Services	4,109	7.3%	7.4%
	Total Intercity Services	8,244	14.6%	7.9%
	Local Services	*	*	*
	Total Data & Voice Services	56,285	100%	7.9%



### 1.5.2 GTA Operating Expenditures

Operating expenditures represent costs to GTA for services it manages and makes available to departments on a cost recovery basis. Expenditures for 1981/82 amounted to \$64,413,083, an increase of 26.3% from 1980/81. This increase is attributed to both tariff revisions and increases in demand for services through GTA.

### 1.5.3 GTA Overhead Expenses

GTA overhead expenditures for 1981/82 amounted to \$6,652,514, which is 9.4% of the total costs recovered. This percentage has continued to maintain a downward trend as the total cost for services increases.

### 1.5.4 Comparison of Costs of Using Government Intercity (IX) Network and Public Long Distance Network

The following information provides a comparison of the costs involved in placing some typical long distance calls from government telephones using direct access to the government intercity (IX) network and direct dialing (DDD) on the public long distance network.

#### COST OF TYPICAL 3 MINUTE LONG DISTANCE CALLS

#### DURING BUSINESS HOURS

<u>Origin</u>	<u>Destination</u>	<u>*IX Network (direct access)</u>	<u>Public Long Distance Network (DDD)</u>	<u>% Cost Savings Using IX Network</u>
Ottawa	Kingston	\$ .75	\$1.57	52.2%
Ottawa	Montreal	\$ .81	\$1.70	52.3%
Ottawa	Toronto	\$ .87	\$1.85	53.0%
Ottawa	Windsor	\$1.38	\$1.91	27.7%
Ottawa	Calgary	\$1.68	\$3.15	46.7%
Ottawa	Halifax	\$1.29	\$2.58	50.0%
Ottawa	Vancouver	\$1.98	\$3.15	37.1%
Ottawa	Winnipeg	\$1.44	\$2.85	49.5%

\* Government intercity network charges used to derive the above information include the portion of GTA overhead applicable to these services. If operator assistance is required an additional charge of \$.50 per call is levied.

Based on ongoing studies within GTA, the estimated aggregate net savings derived by Government are of the order of 40% as compared with commercial services available directly from the common carriers (e.g., direct distance dialling).

The sizable savings that result from using the government intercity network should encourage its use whenever possible and should demonstrate to telecommunications management personnel the value of monitoring the telephone usage within their departments as set out in Chapter 436, section .6, of the Administrative Policy Manual.

## 1.6 Forecast of Expenditures and Personnel

Tables 5 and 6 contain forecast data for the years 1982/83 through 1986/87. Telecommunications operating and capital expenditures have been forecast using exponential regression techniques while forecast data for personnel related expenditures have been developed using growth in person-years reported by departments and cost increases of 6% for 1982/83, 5% for 1983/84 and 7% for subsequent years. The forecast for subsequent years is not based on specific fact and is subject to changes in Government policy.

Government priorities in the period covered by this report indicate increasing emphasis on telecommunications improvements.

Total telecommunications expenditures including personnel related expenditures are forecast to increase by 16.1% in 1982/83, 11.8% in 1983/84, 12.6% in 1984/85, 12.4% in 1985/86 and by 12.6% in 1986/87.

Total telecommunications expenditures forecasts were developed by using forecasts of its component parts. Operating expenditure forecasts indicate growth in 1982/83 of 13.1%, growth in 1983/84 and 1984/85 of 11.7% and growth in 1985/86 and 1986/87 of 12.5%.

Operating and capital expenditures together are forecast to increase by 19.1% in 1982/83, 13.3% in 1983/84, 13.5% in 1984/85 and 14.2% in 1985/86 and 1986/87.

Because of the limited nature of their derivation and the unknown influences which may affect future policy, the forecasts contained herein are offered as indicators only and not as inflexible planning aids.

## 2. Telecommunications Systems Review

The last issue of the Annual Review provided a summary of the problems associated with gathering and presenting information pertaining to government telecommunications systems. As details of the components and characteristics of systems are required by

departments and the Government Telecommunications Agency (GTA) for effective planning, monitoring and control, GTA has continued its efforts to develop a standardized method for recording and reporting telecommunications systems data.

The 1981/82 review of existing systems highlights the shared voice and data services administered by GTA.

## 2.1 Inventory of Telecommunications Applications (IOTA)

Since last reported, the first phase in the development of IOTA has been completed and the second phase is in progress.

### 2.1.1 Phase 1 - Needs Identification Study

Information for this phase of the project was supplied by key personnel within Environment Canada, Revenue Canada - Customs and Excise, National Energy Board and the Department of Communications. The study report presented to GTA identified information processing and data element requirements, management and administration data flows and environmental factors to be incorporated in the development of an integrated information system. The key recommendation of the study report was that the development of IOTA proceed to the next phase.

### 2.1.2 Phase 2 - Feasibility Study

The feasibility study is required in order to demonstrate whether or not a government-wide standard for telecommunications inventories can be developed that will meet the needs of departments involved in planning, establishing and managing the effective use of telecommunications facilities and services.

Participants in the study are representatives from Employment and Immigration Canada, Environment Canada, Supply and Services Canada, Indian and Northern Affairs, Public Works Canada, National Research Council Canada, National Library of Canada, Ministry of State for Economic and Regional Development, Department of Communications and Treasury Board Canada.

The feasibility study report will:

- a) identify the characteristics of existing or planned similar systems within departments;
- b) show the need of departments to gather and analyze information in order to comply with Treasury Board, GTA and departmental policies;

- c) describe the information requirements of Treasury Board and GTA as central coordinators of the telecommunications facilities and services used by the Government;
- d) demonstrate a conceptual system which will meet the above requirements and which is structured such that a department can use a module to develop its own customized system;
- e) identify alternative hardware/software configurations that can execute the conceptual system;
- f) identify the financial impact of selecting any alternative.

If the development of IOTA is feasible, progress will be presented in subsequent issues of this Review.

## 2.2 Government Telecommunications Agency Services

### 2.2.1 Local Shared Services

The Government Telephone Network has been expanded to 24 centres by the consolidation of services in Sudbury and Kingston, Ontario, Abbotsford, B.C. and Charlottetown, P.E.I. Within each consolidation, participating federal Government departments/agencies are linked by sharing the use of a Centrex or Private Automatic Branch Exchange (PABX) for local service. GTA is presently examining the cost benefits of consolidating services at Sydney, N.S. and Thunder Bay, Ontario.

In 1981/82 there was an overall increase of 16,710 (10.30%) telephone terminals accessing consolidations. The following table presents a five year comparison of total terminals accessing consolidations.

#### TOTAL TELEPHONE TERMINALS ACCESSING CONSOLIDATIONS

	MAIN LINES	EXTENSIONS	TOTAL TERMINALS	PBX LOCALS & EXTENSIONS	TOTAL
1977/78	78,289	57,384	135,673	NOT AVAILABLE	-
1978/79	75,391	64,309	139,700	17,110	156,810
1979/80	75,520	58,377	133,897	16,451	150,348
1980/81	73,419	58,795	132,214	14,845	147,059
1981/82	77,284	61,075	138,359	25,410	163,769

New and upgraded call detail recording systems permitting equitable cost allocation to users were implemented in 1981/82. All of the consolidations listed below now have the capability of producing a complete detailed profile record of selected telephone calls for accounting and usage reporting purposes.

Call Detail Recording Systems	
<u>New</u>	<u>Upgraded</u>
Rimouski, Que. (SL-1)	St. John's, Nfld (LAMA)
Kingston, Ont. (TABS)	Quebec, Que. (TABS)
Sudbury, Ont. (TABS)	Montreal, Que. (TABS)
Nanaimo, B.C. (SL-1)	Sherbrooke, Que. (TABS)
Abbotsford, B.C. (SL-1)	Toronto, Ont. (SL-1)
	London, Ont. (TABS)
	Hamilton/Burlington, Ont (TDA)

#### 2.2.2. Government Data Network Service (GDNS)

The Government low speed computer-controlled message and data switching system contracted with CN/CP Telecommunications is now under study with a view to upgrading on the basis of modern shared data system. Departments with high message volumes are opting for the updated terminals which will reduce line rental through greater message volumes in shorter time periods.



TABLE 1

- 25 -

## TELECOMMUNICATIONS EXPENDITURES BY CATEGORY

OPERATING EXPENDITURES	1979/80 (\$000)	% CHANGE	1980/81 (\$000)	% CHANGE	1981/82 (\$000)
Telephone Services—Common Carrier, GTA	112,735		110,886		164,490
Message, Data Communications Services—Common Carrier, GTA	48,323		52,815		49,983
Other Communication Services	15,031		10,349		9,857
Computer Communications Services	N/A		11,843		17,949
Repair—Lines Telecom Equipment Broadcasting, Radio & TV Relay & Booster Stations, Telephone Exchanges, Telecom Equipment for Computers	4,496		8,731		4,197
Rentals—Telecom Equipment not included in normal telephone service	11,035		20,169		13,764
Comparable Total (Operating)	191,620	5.7	202,554		
TOTAL OPERATING	191,620	12.1	214,793	21.1	260,150
CAPITAL EXPENDITURES					
Telecom Equipment—Related Parts & Consumables excl Computers (ADJUSTED)	15,781		5,023		5,319
Telephone & Telegraph Lines, Broadcasting Radio & TV Relay & Booster Stations, Telephone Exchanges			17		276
Telecom Equipment excl Computers (ADJUSTED)	33,372		39,025		36,505
Comparable Total (Capital)	49,153	46.9	72,205		
TOTAL CAPITAL	49,153	46.9	72,222		42,100
ADJUSTED TOTAL			44,065	- 4.5	42,100
PERSONNEL RELATED EXPENDITURES					
Professional & Special Services	656		939		2,212
Salaries	108,114		132,569		145,224
TOTAL PERSONNEL	108,770	22.7	133,508	10.4	147,436

\* Comparable Totals: As a result of the implementation of specific economic objects for telecommunications, the 1980/81 totals do not compare with the previous years total. Adjustments have been made to 1980/81 totals in order to produce totals that are comparable with the previous year.

\*\* Capital expenditures reported in 1980/81 have been adjusted to reflect refinements made by National Defence in the separation of telecommunications embedded in weapon systems versus strategic operational and administrative telecommunications capital expenditures.

TABLE 2

BREAKDOWN OF OPERATIONAL TELECOMMUNICATIONS  
EXPENDITURES FOR 1980/81 AND 1981/82

YEAR	SERVICE	(\$) O2 OPERATIONAL TELECOMMUNICATIONS EXPENDITURES (\$'000)	(%) DISTRI- BUTION OF O2 EXPENDITURES	(\$) O2 OPERATIONAL TELECOM. EXP. RECOVERED BY GTA (\$'000)	(%) DIST. OF COSTS RECO- VERED BY GTA	(%) OF TOTAL O2 RECOVERED BY GTA
1981/82	V O I C E	88,043	37.4	57,741	81.0	65.6
	LOCAL SERVICES	81,595	35.1	3,376	4.7	4.1
	INTERCITY	35,411	15.2	10,211	14.3	28.8
	LOCAL SERVICES	27,374	11.8	0	0	0
	TOTALS	232,423	100.0	71,328	100.0	30.7
	V O I C E	69,468	40.2	45,299	80.5	64.7
1980/81	LOCAL SERVICES	47,864	27.5	2,742	4.9	5.7
	INTERCITY	39,683	22.8	8,244	14.6	20.8
	LOCAL SERVICES	16,535	9.5	0	0	0
	TOTALS	174,050	100.0	56,285	100.0	32.4
	V O I C E					
	D A T A					

TABLE 3  
TOTAL TELECOM EXPENDITURES (INCLUDING SALARIES)

- 27 -

DEPARTMENT / AGENCY	1981/82 TOTAL TELECOM. (INCL. SALARIES) (\$'000)	% OF TOTAL	1980/81 TOTAL TELECOM. (INCL. SALARIES) (\$'000)	% CHANGE 1981/82 COMPARED TO 1980/81
NATIONAL DEFENCE *	135,680	10.2	135,049	0.5
ROYAL CANADIAN MOUNTED POLICE	83,687	18.6	65,236	28.3
EMPLOYMENT & IMMIGRATION	29,686	6.6	30,146	- 1.5
TRANSPORT CANADA	29,558	6.6	22,415	31.8
EXTERNAL AFFAIRS	23,269	5.2	19,498	19.3
REVENUE CANADA - TAXATION	11,673	2.7	10,044	16.2
HEALTH & WELFARE	7,462	1.7	5,974	24.9
SUPPLY & SERVICES - SERVICES	7,029	1.6	5,614	25.2
FISHERIES & OCEANS	6,927	1.5	N/A	N/A
COMMUNICATIONS	6,149	1.4	7,330	-16.1
INDIAN & NORTHERN AFFAIRS	5,884	1.3	5,252	12.0
AGRICULTURE CANADA	5,849	1.3	4,131	41.6
REGIONAL INDUSTRIAL EXPANSION **	5,020	1.1	5,480	- 8.4
ENERGY, MINES & RESOURCES	4,972	1.1	N/A	N/A
REVENUE CANADA - CUSTOMS & EXCISE	4,913	1.1	4,221	16.4
CORRECTIONAL SERVICES	4,726	1.1	4,301	9.9
STATISTICS CANADA	3,755	.8	2,633	42.6
PUBLIC SERVICE COMMISSION	2,891	.6	2,552	13.3
SECRETARY OF STATE	2,867	.6	2,383	20.3
VETERANS AFFAIRS	2,779	.6	2,093	32.8
NATIONAL RESEARCH COUNCIL	1,802	.4	1,553	16.0
CONSUMER & CORPORATE AFFAIRS	1,756	.4	1,255	40.7
NATIONAL MUSEUMS	1,704	.4	1,246	36.8
JUSTICE	1,567	.3	1,141	37.3
NATIONAL FILM BOARD	1,225	.3	1,217	.7
CANADIAN INTERNATIONAL DEVELOPMENT AGENCY	1,053	.2	908	16.0
FINANCE	843	.2	712	18.4
PRIVY COUNCIL	832	.2	796	4.5
CANADIAN TRANSPORT COMMISSION	810	.2	643	25.8
TREASURY BOARD	802	.2	571	40.5
LABOUR	801	.2	597	33.2
AUDITOR GENERAL	725	.2	499	45.3
PUBLIC ARCHIVES	725	.2	391	46.8
CANADIAN RADIO-TELEVISION & TELECOMMUNICATIONS COMMISSION	437	.1	371	17.8
NATIONAL ENERGY BOARD	427	.1	446	- 4.5
SOLICITOR GENERAL	408	.1	N/A	N/A
NATIONAL PAROLE BOARD	378	.1	220	71.8
ECONOMIC DEVELOPMENT	240	.1	181	32.6
NORTHERN PIPELINE AGENCY	207		156	32.7
ATOMIC ENERGY	176		138	27.5
COMMISSIONER OFFICIAL LANGUAGES	176		111	59.5
SCIENCE & TECHNOLOGY	153		170	-11.7
PUBLIC SERVICE STAFF RELATIONS	140		119	17.6
ECONOMIC COUNCIL OF CANADA	128		118	8.5
MINISTRY OF STATE FOR SOCIAL DEVELOPMENT	125		N/A	N/A
FITNESS & AMATEUR SPORTS	121		N/A	N/A
SOCIAL SCIENCES & HUMANITIES RESEARCH COUNCIL	119		N/A	N/A
CANADIAN HUMAN RIGHTS COMMISSION	104		124	-16.1
SCIENCE COUNCIL OF CANADA	101		103	- 1.9
INSURANCE	98		60	63.3
IMMIGRATION APPEAL BOARD	91		97	- 6.2
CANADIAN INTERGOVERNMENTAL CONFERENCE BOARD	84		92	- 8.7
SUPREME COURT OF CANADA	72		72	0
CHIEF ELECTORAL OFFICER	67		376	-82.2
STATUS OF WOMEN	53		33	60.6
TARIFF BOARD	41		N/A	N/A
ENVIRONMENT CANADA	N/A		14,752	N/A
SUPPLY & SERVICES - SUPPLY	N/A		3,700	N/A
CANADA POST	N/A		5,831	N/A
PUBLIC WORKS	N/A		4,026	N/A
NATIONAL LIBRARY	N/A		438	N/A
COMMISSIONER FOR FEDERAL JUDICIAL AFFAIRS	N/A		171	N/A
CANADA LABOUR RELATIONS BOARD	N/A		104	N/A
TOTAL REPORTED	403,367	89.7	377,260	6.9
ADJUSTMENT FOR TOTAL GOVERNMENT REPRESENTATION	45,319	10.3	15,106	67.0
TOTAL GOVERNMENT TELECOM. EXP. (INCL. SALARIES)	449,686	100.0	392,366	14.5

\* Adjustments have been made to the 1980/81 expenditures as a result of changes in methodology used by DND in the separation of telecommunications embedded in weapon systems versus strategic operational and administrative telecommunications capital expenditures.

\*\* Regional Industrial Expansion was previously reported as the Departments of Industry, Trade and Commerce and Regional Economic Expansion.

**TABLE 4**  
**TELECOMMUNICATIONS PERSONNEL**  
**1981/82**

- 28 -

OCCUPATIONAL GROUP	MANAGERIAL	COORDINATION	EQUIPMENT OPERATION	ENGINEERING MAINTENANCE	ENGINEERING SUPPORT	1981-82 TOTAL
CR - Clerical & Regulatory	9.0	334.3	828.8	-	4.0	1176.1
CM - Communications	1.0	1.1	629.4	2.1	-	633.6
AS - Admin. Services	112.8	156.0	6.6	1.0	2.0	278.4
EE - Electronics	8.0	-	-	186.2	6.0	200.2
OTHER	.5	3.6	122.2	4.3	-	130.6
SCY - Secretarial	-	52.3	72.4	-	2.0	126.7
SL - Secretarial	9.0	43.3	49.0	-	-	101.3
GS - General Services	-	-	-	56.0	-	56.0
CL - Gen. Labour & Trade	-	-	.8	38.0	-	38.8
ENG - Engineering	-	-	-	7.0	20.0	27.0
MA - Messenger Service	-	22.0	-	-	-	22.0
Computer Systems Admin.	6.5	10.1	-	-	1.5	18.1
MO - Machine Operator	-	4.0	10.5	-	-	14.5
FA - Financial Admin.	4.0	5.0	-	-	-	9.0
DR - Drafting	-	-	-	-	9.0	9.0
PS - Purchasing & Supply	2.1	6.3	-	-	-	8.4
DC - Data Conversion	1.1	1.0	4.4	-	-	6.5
OM - Organization & Methods	2.0	1.0	-	-	2.0	5.0
ES - Engineering & Scientific	-	-	-	-	4.5	4.5
SSS - Social Science Support	-	3.0	-	-	-	3.0
RO - Radio Operations	-	-	3.0	-	-	3.0
SM - Senior Management	1.2	-	-	-	-	1.2
EX - Executive	1.1	-	-	-	-	1.1
SE - Senior Executive	1.0	-	-	-	-	1.0
IS - Information Services	1.0	-	-	-	-	1.0
PSC TOTAL	160.3	643.0	1727.1	294.6	51.0	2876.0
UNIFORM	150.1	309.5	1399.1	590.0	93.0	2541.7
CIVILIAN	3.6	26.6	483.6	208.5	3.2	725.5
OTHER	-	-	955.7	2	-	957.7
TOTAL	314.0	979.1	4565.5	1095.1	147.2	7100.9

# TELECOMMUNICATIONS EXPENDITURES AND PERSON - YEAR FORECAST

YEAR	TOTAL TELECOM EXPENDITURES (\$000)	TELECOM PERSON-YEARS REPORTED	FORE- CAST GROWTH %	TOTAL TELECOM PERSONNEL RELATED EXPENDITURES (\$000)	TOTAL TELECOM EXPENDITURES (including Personnel Related Expenditures) (\$000)
1978/79	226,120	5,732		94,022	320,142
1979/80	221,617	6,106		108,114	329,731
1980/81	258,858	7,102		133,508	392,366
1981/82	302,250	7,101		147,436	449,686
1982/83	360,076	7,364	*3.7	162,065	522,141
1983/84	408,061	7,592	*3.1	175,443	**583,504
1984/85	463,105	7,843	*3.3	193,919	**657,024
1985/86	528,719	7,929	*1.1	209,776	**738,495
1986/87	604,119	8,032	*1.3	227,378	**831,497

\* Forecast Growth of Telecom Person-Years provided by reporting departments

\*\* Personnel Related Expenditures were forecast using Person-Years Growth Forecast and 6% for 1982/83  
5% for 1983/84 and  
7% for remaining years

\*\*\* Past years have been adjusted to a comparable 1981/82 base

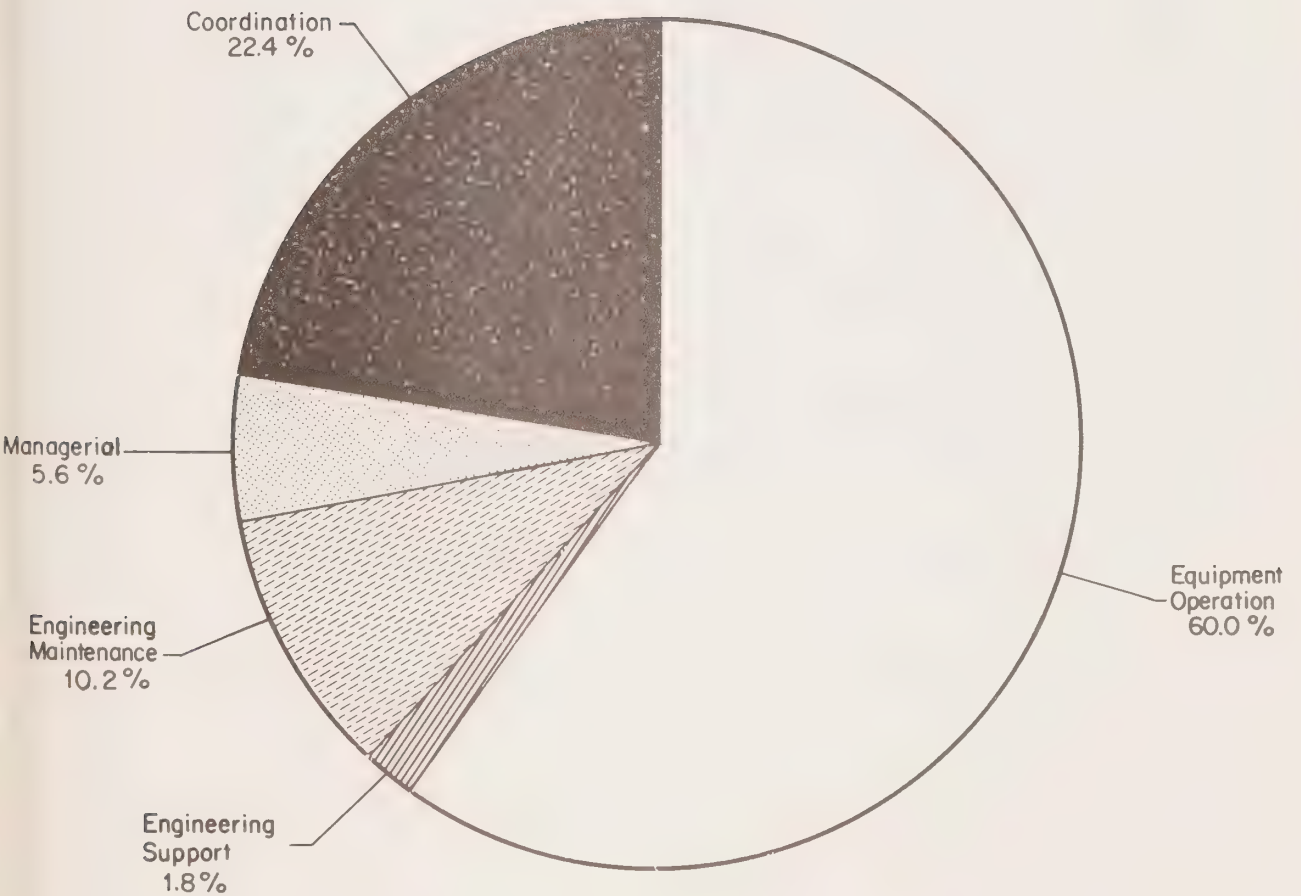


**TABLE 6**  
**SUMMARY OF FORECAST FOR TOTAL TELECOMMUNICATIONS**  
**EXPENDITURES**

YEAR	TELECOM OPERATING EXPENDITURES (\$000)	TELECOM OPERATING & CAPITAL EXPENDITURES (\$000)	TELECOM OPERATING CAPITAL & PERSONNEL RELATED EXPENDITURES (\$000)
1981/82	260,150	302,250	449,686
1982/83	294,157	360,076	522,141
1983/84	328,606	408,061	583,504
1984/85	367,334	463,105	657,024
1985/86	413,282	528,719	738,495
1986/87	464,978	604,119	831,497

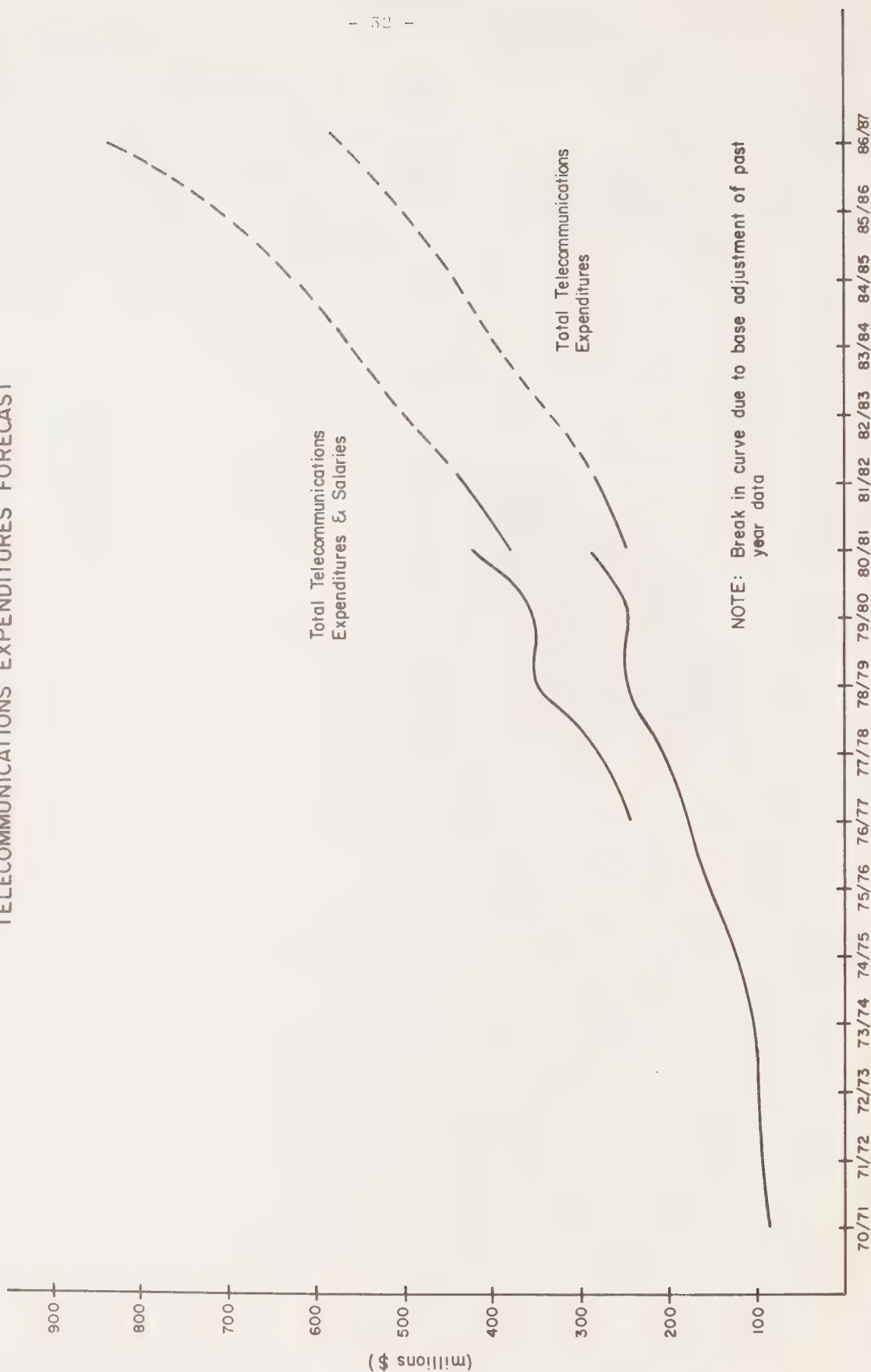
GRAPH 1

PERCENTAGE PUBLIC SERVICE TELECOMMUNICATION  
PERSONNEL EMPLOYED IN VARIOUS AREAS  
ACTIVITY 1981/82



GRAPH 2

TELECOMMUNICATIONS EXPENDITURES FORECAST



## **D. Preface to Long Range Planning Framework**

### **1. Introduction**

Only two years have passed since the potential impact of the electronic industries on the office was identified to planners in the Government. The 1979/80 Annual Review of Telecommunications, supported by an independent study (the Conceptual Definition), presented the initial guidance for Government office automation planning.

Last year this foundation was strengthened and advanced by the 1980/81 long range planning and administrative policy frameworks.

Now it is time to identify new trends, assess direction, and extend the planning framework.

At the second global Futures Conference held in New York in July, 1982, certain maxims were identified as historical trends in telecommunications.

Simply stated, they were:

- 1) Out of the total communications market, the telecommunications share constantly increases.
- 2) There is an increasing pervasiveness of telecommunications systems in the sense that more and more people have access to them (telephones, television, for example).
- 3) The integral cost of telecommunications constantly diminishes.
- 4) As new sources of telecommunications become available to the public and as these proliferate there always remains a use for those previously introduced. (The telephone did not replace the telegraph nor television, the radio).

These trends, which may be assumed to be perpetual, bear remembering as we plan for the future.

### **2. Office Automation Trends**

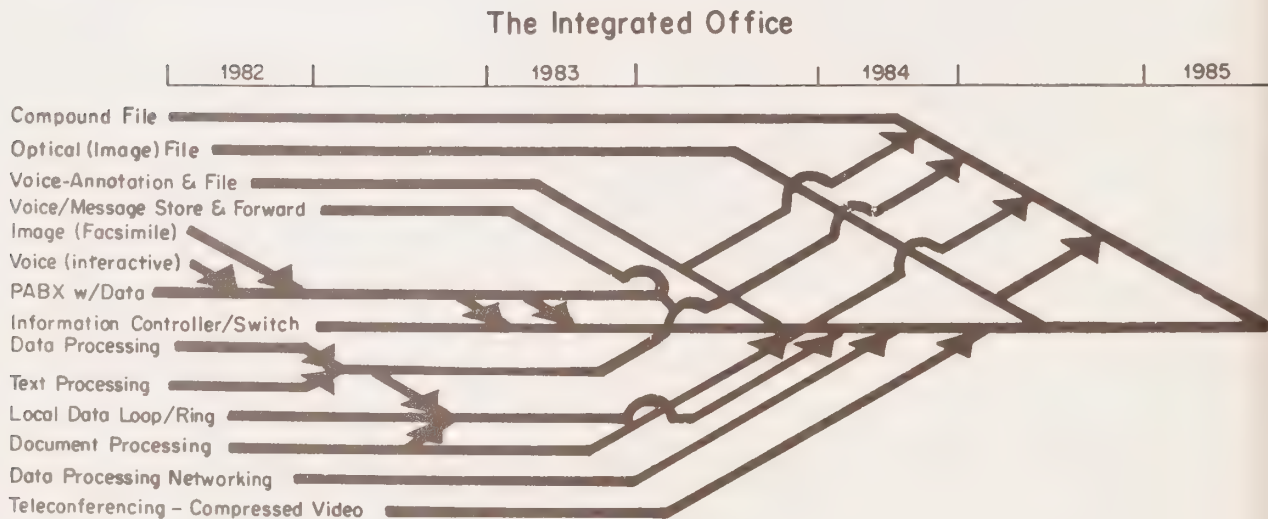
Looking at office automation trends, the speed of change is reshaping the predicted curve in some areas.

Late seventies futurists, for example, saw the paperless office as a reasonable goal. Now high-speed copiers and printers have delayed its advent and shattered its urgency.

Word processors - only a year ago synonymous with "the automated office" - have bowed to the more cost effective, more versatile personal or business computer.

System integration is moving at such a pace that in three years word processing, text, image and voice messaging will be indistinguishable and by 1985/86 all elements of information pertinent to the "compound file" will be available in a single desktop system. (See Figure 1, reprinted with the permission of The Business Planning Division of the Diebold Group, Inc.)

FIGURE 1



The transfer of mainframe capability to the micro has brought about a shift in focus from support staff productivity to managerial thinking and analysis. This highlights the need for decision support software and exposes the fact that the system user is no longer exclusively (or even usually) an EDP specialist. With the advent of multi-user availability, search requirements now outnumber computation at a ratio of approximately 4:1.



Planners should specifically be advised to heed the trend in micro processors to perform a variety of functions efficiently at decreasing costs. Independent word processors are no longer a cost-effective doorway to office automation. They should be considered for specialized applications only and, even then, leased rather than purchased. Third generation micros, with even greater functionality, ease of use, compatibility and growth path possibilities will be introduced in the mid '80s. Managers, however, are advised to fill their needs now and upgrade later. By learning on what is available, users will know how to operate the new generation equipment to its fullest advantage.

It is reassuring to know that indicators continue to support the validity of pursuing the media switch/test bed approach advocated three years ago by the Annual Review. (For a list of pilot projects initiated by departments, please refer to Section F 2.3.2.)

Nevertheless, managers may well be asking how Government departments can proceed, given confined budgetary manoeuvrability.

Appropriately, the theme of the 1982 Federal Office Automation Conference in Washington was "Leveraging Resources through Office Automation". "Faced with major budget cuts and personnel limitations," delegates were told, "Federal office administrators must seek ways to improve workforce productivity at all levels. Office automation can help if implemented in a prudent and cost-effective manner that takes account of users' needs and concerns".

The message, which applies equally to Canadian federal administrators, was to proceed, assured of more than adequate long term benefits - not haphazardly or without caution, but carefully extending implementation over a wide enough timeframe to disseminate costs at a budget-sensitive rate. Productivity gains are no longer restricted to the support staff. Studies have now proven that automated systems can improve the productivity of professionals performing professional tasks by as much as 30 per cent.

In December, 1982 the Comptroller General of Canada encouraged the pursuit of office automation. "While there may be no natural profit or cost reduction incentives to implement office automation in the Government of Canada," he told DOC planners, "the deficit facing us is in itself an incentive. New areas of need are arising and Government departments will be faced with the requirement to reallocate resources. Office automation, well understood, well implemented and well utilized, offers solutions."

### **E. Government Objectives and Priorities**

Restraint, equity and economic renewal formed the framework of Government objectives expressed in the November, 1981 Federal Budget. With expenditures to be reduced from 20.6 per cent of gross national product (GNP) in 1981/82 to 19.2 per cent in 1985/86, priorities were identified as expanded world markets, massive resource projects involving major expansion in manufacturing and transportation, and a new industrial revolution based on high technology.

In its total capacity high technology accounts for a substantial portion of GNP, thus rendering itself literally indispensable to the economic development of the country. In a very real sense the related industries can make a major contribution to the potential achievement of all three stated Budget objectives.

Restraint, for instance, will be addressed in part through improved productivity achievable via new electronic products and services. Equity is continually being strengthened by the improvement and higher standards in communications in rural, northern and other remote areas; and economic renewal will be bolstered if Canada remains competitive in new telecommunications-based technologies and services and the technologies are applied to other areas of production.

In The Innisbrook Papers, published by Northern Telecom Limited following the October 1981 conference, Richard J. Schultz explained the importance of telecommunications systems to public policies:

"As the 'nervous systems of society', telecommunications systems will be seen not only as central to the social and economic infrastructure, but as the vehicles for attaining a broad range of public policies. Thus telecommunications systems, like railway systems in the past, and more recently energy systems, will be designated as chosen instruments to be utilized for the pursuit not only of traditional goals, such as inter-regional and inter-group income distribution, but of goals bearing on such issues as regional development, industrial development, technological sovereignty, unemployment, productivity and foreign investment...".

Federal Government priority in the high technology region was reinforced by Cabinet following the Budget. In January, 1982 the Cabinet Committee on Economic and Regional Development issued guidelines to departments for preparing proposals relating to microelectronics and information technology.

The guidelines focussed on the applications of these technologies as a means of improving productivity and competitiveness in traded goods and services, and recognized the need for government-industry cooperation in developing new applications.

On the same theme the following June \$12 million was allocated for field trial expenditures under the Office Communications Systems (OCS) Program established in 1980 in response to the growing trade deficit in the Canadian office equipment and services sector. The Program's intention is to help Canadian companies develop the industrial capacity to supply the growing national and international markets for integrated office products and services.

One of the major objectives of the Government has been to develop Canadian industrial capacity by the transfer of developed technologies to the private sector. Under the Telidon Industry Investment Stimulation Program \$10.5 million was released in 1981 and 1982 to Canadian firms which undertook to build 6000 Telidon terminals to be made available for use in new Telidon systems operated by the private sector.

## **F. Progress**

### **1. Telecommunications Administrative Policy**

#### **1.1 Telecommunications Management Manual**

The Telecommunications Management Manual, developed by the Government Telecommunications Agency in conjunction with the Telecommunications Advisory Committee, was distributed to all Government departmental Telecommunications Coordinators in September, 1982.

The manual is intended as an aid to departmental telecommunications functions. Telecommunications Coordinators were encouraged to disseminate the information contained in the manual to all telecommunications personnel within their department. This manual should become a useful tool for other employees in familiarizing themselves with all aspects of Government telecommunications management.

#### **1.2 Common Services Policy**

September, 1982 saw the publication by Treasury Board Canada of Administrative Policy Manual Chapter 303 - Common Services. Stating that it is the policy of the Government to provide goods and services through common service organizations, Chapter 303 directs departments and agencies to obtain their goods exclusively through those organizations identified. Exemptions may only be authorized by the Treasury Board.

The common services policy is intended to resolve the perceived uncertainties which seem to have developed over time concerning the roles, goals and accountability of common service organizations.

#### **1.3 Telecommunications Training Syllabus**

GTA issued a Telecommunications Training Syllabus to assist departments in the development of telecommunications personnel. The course selection seeks to assist departments in addressing the needs of Telecommunications Co-ordinators and officers within the Government of Canada, as identified in the Report on Telecommunications Training and Needs Identification and by Co-ordinators at the annual DOC/GTA seminars.

The Syllabus does not provide exhaustive listings for Canadian training and only a sampling of U.S. training is included. Ongoing input from telecommunications personnel will maximize the utility of the Syllabus. Input such as evaluation of training

received will enable GTA to provide a general rating of the relevance of specific courses to Government telecommunications personnel. Factors such as depth and clarity of instruction, as well as subsequent value in the workplace, might be included.

GTA will continue to co-ordinate information such as requests for courses and courses available. The Syllabus will be updated on a regular basis. Here, too, Government telecommunications personnel who have attended or are aware of training not listed in the Syllabus are requested to forward the particulars for inclusion in its next publication. This cooperative effort will help insure the success of the Syllabus and its continued relevance to Government telecommunications personnel.

#### 1.4 New Universal Call Code System

In a continuing effort to improve the call code system a new universal call code system will be introduced by GTA in the final quarter of 1983.

The new system will eliminate the two present systems - national eight character call codes and regional five digit call codes - and replace them with national eight digit call codes. This choice is seen as a method of providing a block of numbers sufficiently large to cover all requirements which will be adaptable to the auto-verification requirements of the new digital switches planned for consolidations across Canada.

Anticipated benefits of the new system include:

- elimination of confusion over which call code for what routing;
- reduced likelihood of abuse;
- compatibility with auto-verification on digital switches
- enhanced confidentiality for greater user confidence

## 2. Planning

### 2.1 Government Telecommunications Development Program

Changes in technology are having and will continue to have a significant impact on Government telecommunications operations - changes such as the introduction of digital technology through the initiation of Government-wide teletex (e.g. CWP), other areas of office communications/automation, the use of satellite technology and the development of integrated services and networks. Of equal significant is the impact of regulatory changes concerning interconnection and terminal attachment.



DOC's response to this in terms of planning strategy is to introduce new innovative applications and services to the Government:

- using to the greatest extent possible existing Government resources where incremental costs would be justified by incremental benefits derived;
- keeping pace with the technology development of the national industry; and
- ultimately establishing the capability of interconnection between any Government office and the national telecommunications systems.

The following summarizes GTA's strategic plans.

#### 2.1.1 Voice Services

The modernization of the Government telephone network is being performed on a consolidation-by-consolidation basis, each consolidation providing local Customer Unit or Central Office centrex type services plus network features such as dial tandeming, automatic route selection, electronic switched network, etc. Planning for the enhancement of the present Government private network is proceeding in two areas, namely:

- i) Modernization of the local consolidations in various cities.
- ii) Modernization of the intercity (IX) telephone network.

For the local consolidations activities planned are:

- Introduction of Enhanced Exchange Wide Dial (EEWD) Bell Canada "Centrex" service for Ottawa/Hull (1983/84).
- Planning on a consolidation-by-consolidation basis:
  - to delineate user requirements and profile best served by Centrex or PABX;
  - to plan for the implementation of a proper mix of Centrex and interconnected PABX within a local region.
- Introduction of rational trunking and pricing policy for interconnection of PABXs to existing and planned consolidations for access to intercity network.

- Introduction of digital switches in other consolidations (dependent on the common carrier construction program for modernizing existing Centrex and Exchange Wide Dial services).

In areas where regulatory conditions permit terminal attachment, the competitive process involving the telephone company and other qualified suppliers will be investigated. The process will involve a Treasury Board submission to obtain approval of the necessary funding, if required.

In all cases a standard uniform national specification is generally used with some adjustments possible for specific regional needs.

To date plans call for the installation of digital switches at the following locations:

a) Vancouver/Victoria

The lack of equipment spares and capacity to respond to meet the additional user requirements have prompted the British Columbia Telephone Company to propose an enhanced telephone service for Vancouver/Victoria to be available mid-1984 which would ensure continuity of service and provide modern features at a cost comparable to the existing service. While it is envisaged that the consolidation will be upgraded along this proposal, GTA is proceeding with a project that will permit competitive offers from suppliers.

b) Calgary

Alberta Government Telephone plans to provide the federal Government users in Calgary with an enhanced Centrex service based on DMS 100/200 technology. Terms, conditions and schedule are unknown at the time of writing.

c) Winnipeg

The Manitoba Telephone Systems decided to replace the current telephone service provided to the federal and provincial Governments in Winnipeg with a modern DMS-based city-wide Centrex service by mid-1983. Impact on cost is unknown at the time of writing.

d) Toronto, Montreal, Hamilton, Quebec City

In 1982 Bell Canada was testing the enhanced DMS-based city-wide Centrex called CENTREX 3 and planned to offer it to governments and industry in Toronto, Montreal and Quebec City. Proposals are pending from Bell Canada.

e) Saskatoon

Saskatchewan Telecommunications (Sask Tel.) plans to offer a DMS-based Centrex service to federal departments in Saskatoon.

f) Other

Proposals are expected from the various telephone companies in the Atlantic provinces to modernize existing telephone services with new DMS or SL-1 equipment.

The timeframes when proposals are expected for the following locations are:

Halifax, N.S.	1984
Fredericton, N.B.	1984
Moncton, N.B.	1984/85
Saint John, N.B.	1984/85
St. John's, Nfld.	1984/85

New Consolidations

A systematic review of requirements is underway to provide cost effective local telephone services based on the new technology developments and the changing regulatory environment for PBX/PABX installations.

The following locations have been identified as potential new consolidations:

Sydney	N.S. (proposal expected December, 1982)
Sept-Îles	Qué.
Thunder Bay	Ont.
Brandon	Man.
Penticton	B.C.
Gander	Nfld. (proposal expected 1985)
Corner Brook	Nfld. (proposal expected third quarter of 1983)

For the Inter-city (IX) Network, the activities envisaged are:

- Examining the implications and feasibility of replacing some existing inter-city tie trunks between consolidations with direct tie trunks between user premises-located PBXs.
- Planning for the introduction of satellite communications into the existing government network for thin route communications and communication between urban centres.

The inter-city portion of the network will be optimized as the network enhancement features become available at each consolidation

#### 2.1.2 Government Satellite Communications Network Service

Satellite communications, with its many unique characteristics, will make available fully integrated, digitally-encoded voice and data as well as video services directly to user premises. Variable bit rates from low to very high make the facilities flexible to accommodate widely varying application requirements. Technologies employing Single Channel Per Carrier (SCPC), Time Division Multiple Access (TDMA) and Demand Assignment Multiple Access (DAMA) make satellite-based communications economically attractive for services to low traffic and widely dispersed locations.

The introduction of satellites into the Government networks will be a gradual process. Elements of the strategic plans for satellite communications may be summarized as follows:

- Development of satellite technology and technical expertise through experimental field trials in co-operation with industry and federal departments.
- Selection of the most viable Government applications which could be cost-effectively supported by a satellite system.
- Development of user-specific satellite systems to meet departmental operational needs.
- Gradual introduction of satellite communications to extend the capability of the shared Government-wide terrestrial network and achieve better utilization of resources, lower cost facilities and more cost effective services.

Specifically, the development plan will call for:

- Gradual introduction of satellite communications as the basis for an all-digital integrated (voice, data, image) Government-wide network.
- Facilities which permit sharing.
- Use of SCPC technology (for thin route and low traffic communications between geographically dispersed locations in situations not economical for TDMA).

- . Use of TDMA technology in cases when dynamic assignment of traffic capacity among stations is cost effective.
- . Use of 14/12 GHz satellite technology to provide rooftop-to-rooftop communications.

### 2.1.3 Government Enhanced Teleconferencing Service

Interest and prioritization for the development and improvement of teleconferencing capabilities in the Government come from the realization that:

- . the benefits of teleconferencing are obvious in a climate hard-pressed to contain rising costs such as travel expenses and to increase managerial productivity; and
- . the current technology on teleconferencing has now matured to the point that it offers unique opportunities for increased cost effectiveness and productivity.

Moreover, in light of the Government guidelines on reduction of travel within the public sector, GTA is formulating plans for the development of a Government-wide enhanced teleconferencing service.

The plan for the development of enhanced teleconferencing capabilities in the Government during the years 1982-1986 includes:

- . Introduction of improved audio teleconferencing on user-arranged "meet-me" basis, but retaining the option of operator assisted basis.
- . Assessment of plans for the introduction of regional teleconferencing centres.
- . Introduction of graphical presentation aides using the application of Telidon, slow-scan TV and other techniques.
- . Introduction of point-to-multi-point one-way limited (or full) video capabilities.
- . Assessment of plans for the introduction of computer teleconferencing and two-way full video teleconferencing.



#### 2.1.4 Government Electronic Messaging Service

The applications of telecommunications in the form of Electronic Messaging Systems (EMS) represents the fastest growing group of services having the greatest potential for long term impact on Government office communications. It encompasses the following types of service:

- i) Telematic Services
- ii) Computer Based Messaging Systems (CBMS)
- iii) Voice Messaging Systems

Telematic services are 'CCITT' defined telecommunications services encompassing Telex, Teletex, Facsimile and Videotex. Each of these services offers messaging capabilities for their users, although messaging is not the principle service for Videotex. Within these telematic services, "teletex" is a standard communications protocol for text communications equipment such as communicating word processors, intelligent typewriters, etc. It facilitates transfer of electronic files among previously incompatible machines. Designed as a replacement for teletype traffic, teletex is highly automated. To send a message all the user has to do is to type in the recipient's address and the system will perform all communications functions.

Competing with teletex is another technology, Computer-Based Message Systems (CBMS), which can provide additional capabilities to teletex; e.g., store and forward; multiple addressing. CBMS supports a wide variety of terminals such as non-intelligent ASCII devices.

The introduction of EMS applications into the Government will be pursued on a number of fronts with the longer term objective of integrating the individual services into a single universal service. Initially, therefore, the approach is to evaluate each service in the EMS family to determine its technical and economic characteristics and its perceived role in the Government organization.

The stages for the planning and development of Government office communications are summarized as follows:

##### a) Development of Government "Telematic" Application/Services

###### Stage I (1982 - 1986)

- Development of Government network of CWP's.
- Development of techniques for interworking of dissimilar CWP's, particularly with respect to resolving protocol incompatibilities.

- . Development of Government Teletex service based on use of federal standard on teletex.
- . Development of videotex services for Government application.
- . Evaluation of evolution of facsimile technology and services in the Government.

Stage II (1983 - 1984)

- . Development of inter-working of GDNS (Telex), Government Teletex and other similar services (Infotex, Envoy 100).

b) Development of Government "CBMS" Services (1982 - 1986)

- . Government-wide electronic mail service.
- . Standardization of communications protocols based on the Message Handling System (MHS) model.
- . Evaluation and development of procedures for inter-working of departmental private CBMS systems.

c) Development of future Government EMS applications (1986 and beyond)

- . Integration of Government telecommunications services.
- . Development of Government facility to inter-work Government telematic systems with Government CBMS.

Service Development Plan (1983/84)

The following Electronic Messaging Systems are planned to be introduced by GTA in 1983/84 to its client departments:

- 1) Based on the evaluation of user demand and the cost effectiveness of electronic mail systems, GTA introduced in the fall of 1982 a Government Electronic Mail Service (GEMS) trial utilizing a common carrier-provided service, the Trans Canada Telephone System (TCTS) Envoy 100, on a Government-wide bulk purchase basis. In 1983/84 GTA will also investigate the feasibility of alternatives, including the use of Government-owned computer-based messaging systems.

- 2) As a first step in the development of a Government 'teletex' (text communications) service, GTA plans to organize a Government-wide application of communicating word processors (CWPs). Planning will address interworking of dissimilar CWPs with respect to resolving incompatibilities. Development of a Government teletex service will be based on the adoption of international and national standards on teletex as federal standards.

#### 2.1.5 EDP Communications

The group of services covered by the term "EDP communications" include:

- Interactive systems for data entry, update and retrieval in real time involving communication between a terminal and a central computer facility.
- Computer-to-computer systems used for data file transfer applications.

In most instances the EDP applications are specialized in the sense that they are specific to each user group and incorporate requirements that are essentially unique to that group. They also rely heavily on the computer vendors' protocols and network architectures. For these the principal communications needs are point-to-point and point-to-multi-point data transmission facilities operating in the medium to high bit rate range (2.4 - 56k bps), although lower bit rates (300-1200 bps) are still widely used.

It is envisaged that, in the near future at least, the EDP communications requirements of the Government will continue to be provided by the common carriers through their existing networks.

The immediate planning strategy is to review the opportunity for the Government to consolidate Government data (EDP) communications requirements in a manner

- that for appropriate EDP applications (dedicated and circuit switched data services) could be replaced by distance insensitive packet switched network services; and
- in which tariff benefits could be derived due to bulk procurement and central network service management.

In the longer term, however, when the Government private network becomes digital on a widespread basis, the ability of the network to support medium and high speed data communications in a cost

effective manner will improve markedly. Also, the potential application of satellite communications within the Government will bring with it a wideband data capability which would prove attractive for many applications.

#### 2.1.6 Shared Data/Messaging Services

An alternative consideration being given in the planning and development of Government EDP and office communications is the possibility to provide a shared network facility which could support both data and electronic messaging applications of the participating user departments.

In April, 1982 a project was initiated to investigate the feasibility of combining data communications facilities in several Government departments with a view to determining the practicality and viability of a shared data network. The study is also intended to address the increasing trend in the individual departments to integrate new office communications applications into existing departmental networks supporting mainly EDP applications.

Through the analysis of user needs on data, facsimile, text and messaging communications and the availability of products and services, the project will address the following areas:

- a) the consolidation of user department data communication networks; and
- b) the feasibility of a Government-wide store and forward message and electronic mail network, including the modernization of the Government Data Network Service (GDNS).

#### 2.1.7 Government Local Area Networks

A Local Area Network (LAN) is a data communications system for interconnecting a number of data handling devices on a common transmission medium. The distance over which it operates ranges from a few metres to several kilometres (typically 1 km), and the area served is usually a floor of a building, a complete building or a cluster of buildings confined to a limited geographic area. The LAN is almost always owned or used by a single organization.

The application of LAN in the Government, as planned by GTA, will essentially support user requirements for EDP communications and office communications.

The development plan to be established will deal with cost effective CBX/LAN alternatives for office communications, including voice.

## 2.2 Activities

### 2.2.1 Government Telecommunications Agency

The environment of evolving advanced technology and regulatory changes surrounding GTA is flavoured by increasing Government information requirements. Current activities of the Agency support Government emphasis on office automation in the areas of electronic messaging, teleconferencing, rooftop-to-rooftop satellite communications, evolution of local and inter-city networks and the development of an integrated services digital network. Some recently implemented and other ongoing management improvement projects of the Agency have accounted for major economic benefits to the Government. These are reported in Section B 3.

#### 2.2.1.1 Trial Project Activities

The Government Telecommunications Agency has recently completed or is currently involved in several pilot trials of innovative telecommunications services and applications which have been made possible by technological advances and regulatory changes.

The major areas in which these trials are concentrated are electronic messaging and satellite communications. In the area of electronic messaging, trials have been conducted of both text messaging (DOC CWP Network Pilot Trial) and personal messaging (ENVOY 100) applications.

In the area of satellite communications GTA is presently involved with CNCP on a trial of the SLIM TDMA system which was jointly developed by DOC and CNCP. A second TDMA trial is planned for early 1983 with TCTS. This trial is a forerunner of the TCTS Integrated Satellite Business Network (ISBN) service which has been announced to start in late 1983.

#### A) Satellite Trials

The satellite telecommunications trials were undertaken in order to evaluate and demonstrate to user departments the unique attributes of satellite systems which could lead to new efficient and cost-effective intra-government communications. The principal objectives of these trials are to:

- evaluate the applicability and opportunity for use of state-of-the-art satellite technology in Government operations, and
- stimulate the development of Canadian satellite communications.



The two trials sponsored by GTA are:

i) ANIK-B Federal Government Telecommunications Field Trial

This trial, which was announced on June 18, 1981 by the Minister of Communications, provides communication services among the offices of three federal departments using the 14/12GHz portion of the ANIK-B satellite and TIME DIVISION MULTIPLE ACCESS (TDMA) technology jointly developed by DOC and CNCP and built by Miller Communications Systems Ltd. In addition to GTA's applications, the network serves those of the Canada Employment and Immigration Commission and the Atmospheric Environment Service of Environment Canada.

The network also employs Single Channel Per Carrier (SCPC) technology. The SCPC technology is well suited to provide service to low traffic volume locations while the TDMA technology, which integrates the transmission of voice, data, and video signals to enable the more efficient use of channel capacity, is better suited to locations having higher traffic volumes. The network operates in a "rooftop-to-rooftop" configuration with several of the earth stations located on user premises. TDMA earth stations are located in Ottawa, Toronto, Montreal, and Bathurst, New Brunswick while SCPC earth stations are located in Ottawa, Newmarket, Ontario, and Frobisher Bay, North West Territories.

The applications were phased in during the period May to October, 1982. The trial was completed in February, 1983.

ii) TCTS/TDMA Satellite Communications Trial

A second satellite communications trial, to be carried out by GTA jointly with the Computer Communications Group of the Trans Canada Telephone System, was announced by the Minister of Communications on December 2, 1981. This four-month trial, also using TDMA earth stations operating in a rooftop--to-rooftop configuration, will take place early in 1983 and serve as a service trial for the Integrated Satellite Business Network (ISBN) service offering announced to commence in the latter part of that year. In addition to the federal Government, the Bank of Nova Scotia and Dome Petroleum are also participating in this trial. GTA's client departments will be National Health and Welfare, Revenue Canada-Taxation, and the Atmospheric Environment Service of Environment Canada. Earth stations will be located in Halifax, Toronto, Calgary, and Ottawa. The Ottawa earth station shared by all participating user departments will be located on the premises of National Health and Welfare at Tunney's Pasture. The other earth stations will be located on the premises of other user organizations or TCTS.

### Outcome of Satellite Trials

As these trial projects are still in progress, it is premature to draw any firm conclusions at this time. From the perspective of GTA, the experience and knowledge gained from these trials will form the basis of its decision on the development and introduction of a shared satellite network service to meet the needs of federal Government departments. The trials also provide an opportunity to demonstrate the potential benefits of satellite services to client departments. From a wider perspective, these projects complement the work of the DOC Space Sector to enhance Canadian capabilities in satellite communications. The trial projects have influenced and will continue to influence the development of Canadian satellite communication services and related industries.

### B) Electronic Messaging Trials

In the area of electronic messaging, trials have been carried out or are underway to support the planning for an orderly introduction of electronic messaging applications and shared services in the federal Government. The trials were undertaken to examine both the technical and behavioural implications involved in the introduction of these systems.

The objectives of the continuing work in this area are:

- (a) to establish cost effective electronic text communications capabilities and applications in the Government;
- (b) to identify technical and behavioural ramifications in the implementation of electronic text communications network services;
- (c) to identify those user applications most suitably served by an electronic text communications network and to develop user guidelines for orderly introduction of these applications; and
- (d) to enhance DOC's capacity to be at the leading edge in the implementation of information technology innovations.

### i) Government Text Communications Pilot Trial

As the first step in the development of a government-wide text communications (teletex) service, early in 1982 GTA spearheaded the establishment of a communicating word processor (CWP) network within the Department of Communications.

Communication between CWP's was carried out using the federal Government Inter-city Telephone Network. The CWP network, initially managed by GTA on a trial basis, is now fully operational and management has been transferred to the Division of Administrative and Technical Services of DOC. At the conclusion of the trial phase in March 1982 the network linked all six DOC regional offices and five headquarters offices.

In addition to examining the technical, economic, and operational issues for such a network, some behavioural concerns were also addressed.

Among the technical issues under study are communications between dissimilar word processors, the use of word processors with computer-based messaging systems and public data networks, the use of protocol convertors, and the use of encryption techniques.

During the fall of 1981 GTA consulted with 15 federal Government departments to determine their requirements for electronic text communications services. Of these, 12 departments expressed an interest in participating in a Government-wide text communications trial service. As a result of the identified need, GTA is engaged in development activities to implement such a service.

ii) Envoy 100 Trial

Envoy 100 is a personal store-and-forward messaging service introduced in the fall of 1981 by the Computer Communications Group of the Trans-Canada Telephone System. To evaluate this service GTA instituted an in-house trial lasting three-to-four months. The service was implemented as a general communications vehicle, to be used for whatever application that trial user thought would be effective. The objective of the trial was to assess ENVOY 100 in terms of its practicality and cost effectiveness as a potential shared message service option in the federal Government.

The trial was evaluated both in terms of equipment and communications cost and in terms of benefit through increased productivity. The findings were that the service resulted in an increase in productivity the value of which was roughly equal to the increased costs incurred. As a result of this trial, GTA has instituted the Government Electronic Message Service (GEMS) which provides ENVOY 100 service on a shared Government-wide basis. GEMS is currently offered on a trial basis.

#### 2.2.1.2 Modernization of Telecommunications Switching Facilities

The Government telephone network consists of over 20 consolidations (all major cities), the largest being Ottawa-Hull with about 82,000 telephones and the Government of Canada switchboard, served by some 120 operators. Ottawa-Hull also serves as the hub of the Government Inter-city Network. It is, however, based on obsolete technology that precipitated users' complaints as to quality of service and availability of features. Further shortcomings characterize the Vancouver consolidation, comprising 6,000 telephones. These two consolidations represent priority items for modernization.

##### Ottawa/Hull

An agreement has been negotiated between Bell Canada and GTA to upgrade the Ottawa-Hull consolidation with the installation of a modern digital city-wide centrex service (based on the Northern Telecom SL-100 switch).

The enhanced digital centrex service will provide modern station features such as call transfer, conference three-party, call forward all calls, no answer, busy, call waiting, call pickup, touchtone, do not disturb, etc..., push button activated feature sets, modern electronic operator consoles, complete and accurate Station Message Detail Recording and, in some cases, realtime validation and recording of authorization codes input by the operator or directly entered by the caller using the Direct Inward System Access feature. In addition, modern network services such as dial tandeming and automatic selection of the most economical long distance route are also available.

These features make possible more cost effective telephone configurations, a more efficient inter-city network routing, a higher portion of calls originated and answered without operator or secretarial intervention, a better control of telecommunication expenditures because of complete, accurate call detail recording and toll restriction capabilities per station per route and type of long distance facilities.

As the interim CRTC decision to allow attachment of certified terminals to common carrier facilities and networks allows terminal attachment suppliers to compete for the provisions of the Government telephone service in Ottawa-Hull, various alternatives were considered for the provisioning of the service.

Following careful analysis of the equipment availability and capabilities of various terminal attachment suppliers, and the added length of time which would be required to modernize the



Ottawa-Hull consolidation on a competitive basis, it was concluded that it would be in the best interest of the federal Government to accept the new enhanced service offered by Bell Canada.

GTA negotiated with Bell for this service under tariffs without long term contract commitments that will permit the flexibility to continue with Bell as long as the service meets the requirements in a cost effective manner. Subsequently, GTA received approval from Treasury Board to subscribe to the Enhanced Exchange Wide Dial (EEWD) service offered by Bell Canada which is scheduled to be available in September, 1984. Negotiations also include training plans to cover a period from April '83 to March '85.

The termination of the existing inter-city circuits to the new service and the modernization of the consolidation operator service is scheduled to take place December, 1983. The existing telephone lines (main lines) are scheduled to be cutover to the new service systematically, on a switch-by-switch basis starting in January '84 and ending in September '84. During this cutover phase, the user will perceive a better transmission quality, better station features and a substantially faster and more efficient consolidation operator service. However, increased post dialling delay will be experienced owing to the operating characteristics of the new service. After the cutover phase, the users will have the opportunity to request changes in their telephone configurations. In addition, rotary dial will be replaced at no charge by identical type touch tone. The reconfiguration phase is expected to last from February '84 to mid '85. Billing for the new service will start at the end of the cutover phase.

#### Vancouver/Victoria

(See para. 2.1.1.)

#### 2.2.1.3 New Consolidations Created

In 1981/82 new consolidations were established in the following locations:

#### Kingston, Ontario

Local telephone services leased at Kingston, Ontario by 15 departments have been consolidated into a single system and administered by GTA to take advantage of economies of scale. This new consolidation, comprised of an X-BAR system with 350 main lines plus 52 trunk connections to five satellite systems, commenced operations on February 15, 1982.



### Sudbury, Ontario

A consolidated telephone system consisting of 295 main lines plus 15 trunk line connections from satellite systems was established in November, 1981. The serving vehicle, an SP-1 unit, accommodated direct inter-city service lines to both Toronto and Ottawa, plus OUTWATS facilities to other area points. The new Revenue Canada - Taxation Data Centre is the primary user department.

### Abbotsford, B.C.

A system utilizing an SL-1 unit was put in place at Abbotsford, B.C. and will serve as a telephone "hub" for Solicitor General operations in that area. This system is integrated with the consolidation at Vancouver in such a manner that all IX services are made available to the Abbotsford system users. It is possible to dial directly such users from other Government network locations that have direct dial access to Vancouver; e.g., Ottawa, Winnipeg, Calgary, etc.

Automatic call detail recording systems were implemented in the three new consolidations as well as in existing consolidations in Sherbrooke, Québec City, Montréal, Hamilton, London and North York (Toronto).

#### 2.2.1.4 Intercity Services

A new tie trunk group between Vancouver and Toronto was installed in May, 1981. This group cutover included a total of six circuits.

The special series of transmission tests begun in 1980 was completed in 1981. Upon completion of these tests deviations on IX circuits have been corrected.

Owing to echo problems on Ottawa-Halifax tie trunks, this group has been permanently switched from satellite facilities to terrestrial facilities.

#### 2.2.2 Departments and Agencies

##### 2.2.2.1 Lexicon of Electronics and Telecommunications Terminology (DSS)

Non-uniformity in translation of telecommunications terms into French has become an increasing problem for the federal Government as the hi-tech vocabulary expands in step with the industry. To address this issue, in March, 1980 le Comité de normalisation de la Terminologie de l'Électronique et des Télécommunications was

established. Affiliated with the International Society of Linguists and the International Telecommunications Union, it is composed of a mixture of engineers and terminologists representing Teleglobe Canada, the Departments of National Defence and Communications, Transport Canada and Supply and Services Canada.

The Committee, coordinated by the Translation Bureau of Secretary of State, is tasked to produce a bilingual lexicon for translators in the electronics and telecommunications field, with the emphasis on standardizing French terms. Once the work is completed (hopefully by the Spring of 1983) it is expected to facilitate communication among personnel employed in the milieu it addresses. The lexicon will then be available through any terminal accessing the Secretary of State's terminology bank.

#### 2.2.2.2 Telecommunications Cost Analysis (TECA) (RC-T)

Following a full-scale review of telecommunications costs, levels of service, equipment and administration in 1979, Revenue Canada Taxation initiated a project entitled Telecommunications Cost Analysis (TECA). Terms of Reference called for the project to be completed in three stages: 1) feasibility study, 2) pilots and evaluation, 3) long range plan proposal. The following is an update of these undertakings.

##### (1) Feasibility Study

A Feasibility Study was initiated in early 1981 resulting in a recommendation to proceed with Stage 2 (Pilots and Evaluation) with initial emphasis on the following:

- conversion from ZENITH to INWATS service for Public Enquiries
- reconfiguration of basic telephone systems in pre-selected test sites
- interconnection of basic telephone systems in pre-selected test sites
- introduction of Automatic Call Distribution & Sequencing systems in pre-selected test sites
- development of a Telecommunications Management Manual.

##### (2) Pilots and Evaluation

###### ZENITH to INWATS Conversion

The pilot for conversion of the Toll-Free Enquiry Service from ZENITH to INWATS was carried out in four District Offices, namely Quebec, Saint John, Ottawa and Winnipeg. Evaluation of results indicated that a full scale conversion would be cost effective and

substantial savings could be realized without degradation of service. Accordingly, over the latter part of 1981 most of the District Offices converted with some assistance from GTA. Several offices did not elect to convert to direct in dial service for local reasons but as soon as circumstances permit they, also, will be converted.

#### Reconfiguration

A pilot to determine the practicality of reconfiguring existing telephone equipment to reduce cost and improve service was initiated in four representative test sites in mid 1981. Tests were conducted in two buildings in Head Office and three District Offices of varying size, i.e., St. Catharines (small), Hamilton (medium) and Vancouver (large). Results of these tests were evaluated in late 1981 indicating a 16% decrease in equipment rental costs and a substantial upgrade in service levels supporting Taxation functions. A recommendation was thereupon made to proceed with the reconfiguration of all District Offices, Taxation Centres and Head Office and potential annual savings of \$500,000 were projected.

Senior Management approved and instructions were developed for Operations staff to perform their own reconfigurations as soon as practicable, with assistance from Head Office and Regional GTA representatives. Reconfigurations are underway in a number of locations at the present time.

#### Terminal Attachment

In mid 1981, owing primarily to the lack of experienced human resources and a need to change one of the test locations, it was decided to introduce terminal attachment pilots in representative test sites on a progressive basis. In this way experience would be gained from the initial installation for use in subsequent pilots.

Accordingly, the St. Catharines District Office system was installed in December 1981 to be followed by the Ottawa and Kitchener District Office installations which were cutover in December, 1982 and February, 1983 respectively. After being in operation for 10 months, the St. Catharines system was evaluated as being representative of a small District Taxation Office.

An analysis of the evaluation of the St. Catharines pilot revealed that the system installed in that office (ITT System 3100) had received wide acceptance, was operating efficiently and was cost effective. Annual savings in the amount of \$24,000.00 are being realized as a result of equipment rental savings and additional economies will be forthcoming because most installations and

relocations of equipment are now being performed by RCT rather than Bell Canada. The level of service has also improved considerably. As a direct result of the St. Catharines pilot evaluation, a recommendation has been made to introduce inter-connected telephone systems in most of Taxation's small District Offices now being served by carriers subject to CRTC regulation.

The Ottawa and Kitchener District Office installations are scheduled for evaluation in 1983.

#### Automatic Call Distribution and Sequencing (Public Enquiries)

Based on the St. Catharines District Office pilot, it was concluded that the additional cost of stand-alone Automatic Call Distributors and Sequencers was not yet warranted or cost effective for offices of that size. Therefore the recommendation was made not to install such equipment in offices being serviced by eight public enquiry lines or fewer except to ensure that the functional and technical specifications clearly specified to the vendor that the system had to be capable of handling a heavy annual enquiry workload which peaks during the filing season. The St. Catharines system handles this workload quite efficiently.

Assessments of Automatic Call Distributors (ACD) and Automatic Call Sequencers (ACS) were made based on a modern ACD (SLI) in operation in the Vancouver District Office and a Sequencer (ACS60) being used in the Kitchener Office. As a result of the assessments, a recommendation has been made to introduce Automatic Call Sequencers in the medium-sized offices and Automatic Call Distributors in the two largest District Offices (Toronto and Montreal).

A considerable amount of research has also been done with respect to the introduction of Automatic Answering Devices for servicing Refund Enquiries. A limited number of these machines were being used in several District Offices. In-depth analyses revealed that they were cost effective and should be introduced in all District Offices. This recommendation has been made and agreed upon by authorities who have functional jurisdiction for the Public Enquiries function and at the time of reporting the department was in the process of introducing answering machines across the country.

### 2.3 Analysis of ITSPs

#### 2.3.1 General Remarks

Sixty-three departments and agencies were requested to complete the Telecommunications Section of Information Technology and Systems Plan (ITSP) distributed by Treasury Board May 31, 1982.



These figures show a decline in the number of substantive reports from last year (27) and a 65% rise in those containing nominal information with the tables.

For the most part, the large users provide significant plans. On the other hand, several smaller organizations appear to be managing their telecommunications more efficiently, giving serious concern to the difficulties presented by the changing technologies and the need to plan accordingly.

Cost savings achievements in departments and agencies were identified in terms of

- upgrading equipment and services
- installing dedicated GDNS terminals
- implementing IN-WATS services and converting to OUT-WATS service from DDD.
- tightening call code controls
- relocating and consolidating staff at headquarters (an identified saving by the Auditor General of \$1400 per month plus reduction in equipment)
- program freezing
- improving telecommunications administration and management
- purchasing equipment previously leased (CIDA, for example, predicts a saving of \$55,000 annually by purchasing intercom equipment in 1983)
- teleconferencing (by reducing the number of face-to-face meetings)

Certain noteworthy activities have been described in some detail in para. 2.2.2 of this section. In addition to those, mention should be made of a joint Supply and Services/Canada Post Corporation initiative to improve the TELEPOST service, resulting in a savings achievement through reduced use of full rate and night letter telegrams.

Expenditure and person/year increases were attributed to greater usage, higher carrier tariffs and hence GTA rates, increased data facilities and services, decentralization, program expansion, reorganizations, relocations, major building installations and repairs.



Restraint measures were noted to have had an effect on the forecast plans for 1981/82. Target dates for installation and replacement of facilities were deferred in some instances and leased equipment had to be returned in another. Meanwhile, cost effectiveness evaluations rose in priority.

### 2.3.2 Plans

Departments' plans indicated support for both shared local services and facilities and terminal attachment.

Switches headed the list of significant acquisitions reported, 10 organizations indicating past or current year purchases or rentals and five planning to acquire them within the next five years. The rationale given was to reduce costs, improve and streamline telephone systems. In several cases assessments are planned in terms of cost benefit comparisons with Enhanced Exchange Wide Dial (EEWD) centrex.

Although voice remains the most used service, a steady increase in data requirements is indicated. Telex terminals are being updated at a steady rate to reduce person/year requirements, facilitate speed and accuracy and streamline operations. Word processors and digital facsimile equipment also are high on the list of acquisitions for similar reasons.

Five departments and agencies (Correctional Services, Canadian Industrial Development Agency, Human Rights Commission, Employment and Immigration and Atomic Energy Control Board) reported past or planned acquisition of voice teleconferencing equipment. Favourable comments were recorded by those already engaged in this activity.

Considerable activity is apparent in the area of internal development. Where management reviews have taken place, improved planning and organizational structures have resulted. Although in most departments and agencies the responsibility for office automation is housed within the EDP framework, seven organizations are addressing the issue of integrated technologies by creating special cells or considering organizational realignments; four others already have such structures in place.

Varying complexities of office automation activity were reported by 16 departments and agencies. For the most part, it encompassed word processing, electronic messaging, teleconferencing and records management automation. Telidon is usefully employed by service-to-the-public oriented departments. Interest in voice/data terminals and multi-functional workstations has gained momentum through the Office Communications Systems program field trials, but little activity had begun in this respect at the time of reporting.

Pilot tests and feasibility studies underway or planned have been reported as follows:

- Telex and facsimile systems (CCS) (LC)
- electronic mail (PSC, AECB, RCMP)
- PABX (RC-T, CEIC, IAND)
- satellite communications (CEIC)
  - voice transmission
  - teleconferencing
  - word processing
  - facsimile
  - data transmission
- TDMA satellite communications (HWC)
- fibre optics intelligence conveyance (RCMP)
- satellite applicability and utilization (RCMP)
- automatic answering devices (RC-T)
- CNCP Infotex (NPB)
- communicating word processors (EA, CEC, EMR, LC, IAND)
- distributed processing network (TC)
- Displayphone (CIDA)
- conversion of toll-free services from Zenith to IN-WATS (RC-T)
- toll-free service in Ontario (CEIC)
- multifunctional workstations (MSST)
- automatic call distribution and sequencing (RC-T)
- integrated office automation system (DND, RC-C&E)
- automated records retrieval system (IAND)

Twenty-three departments reported some activity with respect to a review of telecommunications services and/or equipment, ranging from monthly audits to two full scale reviews in '82 and another within the next two years. Overall reviews at staged intervals have been incorporated into a few planning schedules where management procedures have been tightened.

### 2.3.3 Annual Reporting Requirements

Despite the retarded pace at which the ITSPs were returned, only one department disagreed with the reporting date. Favourable comments on the requirements to report indicated the exercise is worthwhile as a "checklist for interval planning and collaboration with various branches of the department", a controlling mechanism on uses and costs and as a "very useful means of obtaining Treasury Board approval in principle of the department's intent".

Other comments suggested the need for clarification of requirements in the areas of personnel and costs, that discrepancy between the coding structure of the report and that of APM Chapter 435 App. B presents difficulties, and that Table 4 (Summary of Telecom Demands) is complicated.

#### 2.3.4 Assessment of Services

In assessing the quality and adequacy of service received from suppliers, departments scored GTA and other suppliers on a par ranging from "satisfactory" to "good". Although cost savings achievements were recognized, GTA's billing procedures were widely criticized and inter-city transmission quality was a repeated source of complaint. As well, GDNS order processing was very slow. It was noted that mobile telephone services in the National Capital Region require improvement. GTA's consulting service was rated helpful and beneficial.

Carriers were judged to be taking more interest in the end user than before the interconnect ruling and provided accurate and consistent billing. While some services had improved, however, others needed upgrading. One report stated that - especially in the National Capital Region - "the lack of state of the art service from the common carrier inhibits departmental potential, particularly in the area of service to the public". Bell's policy respecting minor relocations, causing costly time to the Telecommunications Coordinator, was another source for complaint.

#### 2.3.5 Usefulness of the Annual Review as a Tool for Planning

Comments on the Annual Review varied, however the general opinion was that it is informative and fulfills a useful purpose.

#### 2.3.6 Adequacy of Telecommunications Policy

APM Chapters 435 and 436 have been very helpful to departments in the planning and management of their telecommunications resources, though one report found them inadequate in terms of technology and personnel. A further encouraging note is that distribution of the Telecommunications Management Manual by DOC has acted as a catalyst for internal policy and guideline development.

Deficiencies in existing policies and guidelines were identified in the following subject areas:

- electronic transmission of information which must be protected but does not fall into the category of national security
- terminal attachment
- clarification of the common services policy
- clarification of definitions for "telecommunications" and "telecommunications personnel"
- PBXs within consolidations
- Enhanced Exchange Wide Dial centrex

As well, concern was expressed about the urgent need for new policies to shape the automated office.

### 2.3.7 Training

Most departments and agencies reported minimum telecommunications training activity, but stated their requirements to be significant and urgent. GTA's seminars and TSO training courses are widely supported. Common carrier seminars, supplier shows, a few private sector courses, some in-house information sessions and training manuals for the most part complete the training framework. In two cases internal courses have been or are being developed (CEIC and RC-T).

In identifying their future needs, organizations have recognized a requirement for both basic and advanced formal training which should include data communications. A need for end user training was also identified and this should take place on the job where operators cannot be replaced for any length of time.

Finally, a universal cry was issued for a programmed approach to disseminating up-to-date information on state-of-the-art technology to keep departments and agencies abreast of developments for planning and budgetary purposes. This was seen as a central agency responsibility.

### 2.4 Telecommunications Advisory Committee

Since its formation in 1977 the Telecommunications Advisory Committee (TAC) has assumed an increasingly valuable position in the federal telecommunications community. An advisory body to DOC and a supportive arm to departments and agencies, the Committee is a focal point for addressing the concerns of the community as telecommunications seeks a new niche in the more complex hierarchy of communications.

Two major achievements of the year had significant economic implications. After many months of negotiations with TCTS an agreement was achieved whereby the Government would procure its Telpak services as a single customer, with the Government Telecommunications Agency acting as its agent. Based on the circuitry procured for DSS, DND, DOE(AES) and Transport Canada, this measure is estimated to be saving the federal budget approximately two million dollars annually. It has been in effect since the first of April, 1982.

The other thrust directly addressing costs was the definition of expenditure coding to permit all costs to be accounted for and made easily visible for departmental and central authority accounting and budget control purposes. As a follow-up to this work, TAC is proceeding to identify information and statistics that will facilitate telecommunications management and to recommend appropriate action on regulations, policies, directives, guidelines and administrative practices.

Other initiatives of the Committee included support to DOC/GTA in providing departments with interim guidance on PBX acquisition and the pursuit of secure transmission of data through RCMP and DND systems. A protected electronic channel connects certain departments to the External Affairs switching system which also handles classified messages.



## **G. Carriers and Industry**

The information contained in this section is intended to inform departments of the developments taking place with the telecommunications carriers - their newest service provisions and plans for future service - and to indicate the progress of Canadian industrial suppliers. This should bring departmental planners abreast of the industry in looking at their own present and future requirements. For the federal Government's posture vis-à-vis these developments, please refer to Section F 2.

### **1. Carriers' Progress**

#### **1.1 Teletex**

An international standardized telecommunications service which allows office text machines from different manufacturers to communicate with each other: that has been the dream of office telecommunications planners and users since the antiquated teleprinter machine started to make room for memory typewriters and word processors. 1982 became the year the dream materialized and once again, as with the advent of each new communications vehicle, Canadians could look forward to closer ties with distant countries of the world.

Following the CCITT ratification of standards for Teletex at the Committee's November 1980 Plenary Assembly, the TCTS Computer Communications Group scored a significant coup by becoming, in 1982, the first supplier of Teletex service in North America. The lack of international agreement to common standards had previously restricted users of this type of equipment to communicating only with fellow users of equipment provided by the same manufacturer.

The unique features of Teletex terminals are that they are fully buffered, operate at 2400 bps, and provide for call set up, message transfer and call disconnect on an automatic basis, without operator intervention. In addition, inputting, editing and printing functions are unaffected by outgoing or incoming calls. One multifunctional terminal used for the preparation and editing of text as well as text communications can replace two conventional devices: a typewriter and a low speed message teletypewriter.

CCG's Teletex service, which uses the public switched telephone network, incorporates an electronic directory and provides transmission of text at 2400 bps to any terminal in Canada or abroad which adheres to the international Teletex specification. Overseas Teletex and Telex terminals are accessed via the Teleglobe gateway.

Different data speeds, such as 50 bps traditionally used for Telex transmission, are not a barrier. The Teletex-to-Telex physical message transfer is handled by the network, with protocol changes made within the terminal. Teletex and TWX will be able to communicate, as well, through a conversion facility being developed by CCG.

As the new service is approximately 40 times faster than Telex and 20 times faster than TWX, Teletex represents the modern alternative to these traditional message services.

Costs include terminal (varying according to user's requirements), access lines (varying across Canada but averaging \$35.00 a month) and usage charges (long distance at tariff and free local calling, as normally experienced for voice communications.)

CCG predicts future enhancements will include a mixed-mode terminal which will allow Teletex and facsimile capability in a common terminal. Teletex is also expected to be able to interwork with the new Group 4 facsimile terminals (which will use the Teletex protocol) and with Videotex databases. While intra-messaging will be its first useful function, it will become a full electronic mail service in its maturity. By early 1984 it is expected to interwork with Envoy 100 to provide multi-point addressing.

On the international scene West Germany, Sweden and Britain had begun Teletex operations and it was predicted that more than 30,000 terminals would be operating in 10 European countries by the end of 1983. CCG expects TWX service to have migrated to Teletex by 1990 and that Canada, alone, will have 140,000 Teletex devices by the end of the decade.

Although the United States was off to a slow start, widespread use of the service is expected within the next two-to-three years as competition among the record carriers increases. RCA Global Communications was the first International Record Carrier (IRC) to go after the \$30M a year transborder Telex market when the IRCs became qualified in 1982 to operate within U.S. boundaries. Western Union Telegraph Co., which has had no direct competition in the provision of Canada/U.S. Telex traffic with CNCP Telecommunications, was also negotiating for the service.

## 1.2 Infotex

CNCP Telecommunications Infotex service is designed to operate not only as an information retrieval system but also as an electronic mail system. It is expected to expand in stages over the year 1982-83. Initially subscribers will have access to other communicating word processors in Canada, the Canadian Telex network and

such electronic mail services as Telepost in Canada and Mailgram in the U.S. Subscribers will be able to communicate with U.S. Telex and Telex 2 subscribers, as well as Telex subscribers in other countries. Though the service was developed to operate at speeds of 1200 bps, 2400 bps protocols will be added which will make Infotex compatible with the Teletex service.

1.3 Field trials which will extend over 12 months began in Ottawa, Toronto and Montreal on an exciting new network developed by Bell Northern Research and the Trans-Canada Telephone System.

iNET, an acronym for "intelligent network", is designed to link business computers, bridging the language differences and providing Canadians with universal access to the computerized data banks using a variety of terminal equipment.

Occasional users, managers, executives and others whose lack of expertise previously denied them access to data processing systems will be able to retrieve information not just from one computer but from a variety of hosts. This is accomplished by embedding value added features in the network, placing the operation and administration of certain functions within the network itself. The network access node, for instance, performs all of the log-on sequence and hand-shaking procedures that would otherwise be performed by the user. Once the user has initially logged on to the system, therefore, access to successive hosts is virtually automatic.

As well, terminals of one speed and type may interface with databases of another. CCG will be provided information for billing and traffic analysis, permitting the Group to perform third party billing on behalf of information and service providers.

The field trials, using Telidon terminals, are designed to assess the market requirements for iNET, Business Videotex and value added services; to evaluate potential market applications within specific communities of interest (travel, finance, retail) to gain expertise in implementation of these services for commercial service introduction; and to support ongoing development work in office automation. Participants are representative of eight major categories of potential users, namely: banking, bibliographic, energy, real estate, communications, law, travel, and Canadian government.

1.4 Other innovative services from Bell include:

- . Vista - Canada's largest field trial of Telidon technology. The user can call up a wide variety of information on the switched telephone network for display on home television screens.

The trial, sponsored jointly by Bell and DOC, is managed by Infomart on a contract basis. Preliminary operations started in Toronto in May, 1981.

- . Datalink - the final portion of the integrated program of digital network services for Canadian computer users.
- . Envoy 100 - a national computer-based messaging system which grew to over 3000 users by mid-1982, about 100 of whom bore federal identification. It operates over Bell's Datapac, TWX or switched telephone network. French language commands are also planned, which will increase its usefulness in the public sector. The service is distance insensitive. Costs are assessed according to the number of characters generated plus overhead. A fixed rate of \$20/mo. is charged in addition to a \$3.00/mo. user rate.
- . Envoy 200 - still in the development stage. It will bridge a family of messaging services: Teletex, TWX, Displayphone and Datapac 3101, all of which will be serviced by an electronic directory. As a value added service it will have store and forward capability. The potential need to resolve the question of responsibility for storage of messages is looming: should it lie with the terminal manufacturers or the carriers?
- . ISBN - an integrated satellite business network initiated in 1981. Plans are to introduce service in 1983 following the launch of the Anik C-1 satellite. It will provide flexible high-speed network services to distant locations. The rating concept, to be based on the ISBN serving area, will be distance insensitive. Rating elements will include a digital transmission station, interface and local distribution charges.

1.5 Bell's computer communications network, Dataroute, is to be monitored by a new network management system (NMS). A million dollar contract was awarded HiTech by Bell to develop software which will allow CCG to respond to customer trouble reports more



swiftly and effectively, incorporating well-sized display boards and colour graphic terminals to display geographical areas across Canada where network problems may occur. Implementation will be phased in over a one-year-plus period.

1.6 Expansion of the TCTS digital network to Vancouver, connecting new digital switches there with similar equipment in Winnipeg and Toronto, has been a 3-year, \$90M project. Existing digital switches in Montreal and Toronto have also been expanded and new digital switches in Ottawa and Montreal are connected to the network over Bell's digital cable facility. The network has been in partial operation since February, 1981. Cleaner transmission and lower background noise on cross-Canada telecom traffic represent the major improvements it offers. Products used include AEL Microtel's GTB-3 EAY switch, Northern Telecom's DRS G8 radio and DMS-200 switch. For information on GTA's plans to provide the government shared services with the new network offerings, see section F 2.

1.7 Capitalizing on the 1979 CRTC system interconnection decision which gave CNCP the right to allow its customers to gain access to CNCP services through the Bell Canada locally switched telephone network, CNCP prepared to make available to major customers private line voice circuits on a fixed term, fixed price basis.

1.8 A further manifestation of interconnect will be a new CNCP service called Econovoice. By means of a voice concentrator the service will permit a single private line to carry two or more simultaneous telephone conversations or their equivalent with no deterioration in quality or loss of privacy. Designed for businesses, industries and government departments which have private network needs for telephone or other telecommunications traffic, it will cut long distance costs by as much as 32 percent on three-year contracts.

1.9 In the area of U.S.-Canadian traffic, CNCP proposed to hook up its broadband exchange service with the Metro-1 service offered by Western Union Telegraph Co., of Upper Saddle River, N.J. This will give subscribers the advantage of making long distance calls into the United States at rates that may be only a third the cost of direct distance dialling calls provided by the telephone companies.

1.10 In July, 1982 Bell Canada announced plans to reorganize its corporate structure to separate the company's regulated telecommunications activities from its non-regulated business. Bell Canada will continue as the regulated utility, owning that part of Tele-Direct's operations dealing with the printing and publishing



of telephone directories, as well as 24.6% interest in Telesat Canada and 30% interest in Bell Northern Research. The new non-regulated company, to be known as Bell Canada Enterprises Inc., will parent existing subsidiaries including the 55%-held Northern Telecom Ltd., Bell Communications Systems, Bell Canada International, Tele-Direct's non-regulated operations, and provincially-regulated telephone operations.

1.11 Within 18 months of the CRTC interim decision on inter-connect 150 telephone equipment companies were in business.

1.12 In response to an identified need to provide a regular forum to review, discuss and introduce matters of mutual interest, a GTA/TCTS Data Operations Coordinating Committee was formed with the following terms of reference:

- review of current, near-term and future data operations, projects and services;
- clarification and confirmation of both parties' objectives, priorities and projects; and
- identification and correction of areas of concern to GTA and TCTS which relate to the daily provision of service.

The TCTS Computer Communications Group initiated a series of seminars for the purpose of acquainting appropriate GTA personnel with their planning and developmental activities. Digital services (covering Dataroute, Datapac and Datalink) was the subject of the first seminar, held in March. It was followed in June by a briefing on value added services.

## **2. Industrial Update**

Although Canada's high-tech industry generally fared better than other Canadian manufacturers in this severely recessed period, Canada is "barely holding its own in the international race to exploit the new technologies". So stated the Science Council in its 1982 report, Planning Today for the Information Society. The Council warned, "While Canadian firms have been competitive in 'stand-alone' products, the trend towards integrated systems imported as entire operating systems is likely to put Canadian firms at a severe disadvantage". The hardware sector in Canada remains largely a branch-plant operation, less than 10 per cent Canadian-owned in contrast to the computer services industry, about 80% Canadian-owned. The Council recommended that Canada choose which products will be developed in Canada, which imported from abroad and which can or should be licenced for manufacture in Canada. The need for a broadly-based chip-manufacturing industry was emphasized. About 20 chip-dependent companies have been left without a domestic resource since 1975.

## 2.1 Office Equipment Products

Government-sponsored field trials are being carried out in federal departments to provide industry and government with experience in designing, planning, operating and assessing integrated electronic office systems. Several Canadian companies have formed consortia to develop integrated systems for the trials, including Bell Northern Research, Office Communications Research Associates and Systemhouse, among others. (For details of the field trials, see section H 5.1.)

2.1.1 Both Mitel Corp. and Northern Telecom Ltd. are commanding the attention of foreign and domestic markets with their developments in integrated voice and data digital switching systems. Mitel's SX-2000MG and Northern Telecom's SL-100, which will handle up to 10,000 and 30,000 lines respectively, are designed to serve large-capacity requirements such as those of government and industry. The equipment can switch telephone and computer data as well as act as the core of an electronic office communications system.

2.1.2 Along with SL-100, Northern Telecom provides two other members of the SL Family. The SL-1 business communications system serves from 80 to 5,000 lines and the SL-10 data packet switching system is designed for private data communications networks to permit exchange between a variety of computers and terminals. The smaller SL-1M, a new digital PBX that will handle 60 - 400 lines and boasts the capability of moving the telephone from one plug to another while in use without losing the connection, was also introduced. Call detail recording capability allows call detail records to be collected on an optional type unit located inside the SL-1M cabinet, and used for record-keeping or processed into cost control reports.

2.1.3 The SX-2000 is the first of a family of large integrated switching systems that can transmit data at a rate of 256 kbps. As an office automation supplier, it offers a terminal that can be an executive or professional workstation, a word processor, a powerful graphics terminal, a console or a remote diagnostic tool and switch programmer. Hardware includes a full computer keyboard, a telephone keypad, a 16-bit microprocessor and a bit-mapped video screen. The SX-2000 is to be connected to its peripheral devices by a Xerox Ethernet-based data link. By December 1983 this interface is planned to be expanded to include access to foreign peripheral devices such as computers and advanced work stations. Ethernet will also provide the medium to expand computing capacity and mass storage in the SX-2000 for the automated office.

2.1.4 Bell Northern's Displayphone is being marketed by the CCG as Bell's initiation to the automated office. Combining enhanced voice and data services which can be used either separately or simultaneously, it is designed as a managerial workstation. The data package uses Envoy 100 services, permitting access to both local and most public data bases. The product was marketing in 1982 (on a purchase basis only) for just under \$2500 plus a \$20-a-month maintenance charge.

2.1.5 In the fall of '82 Mitel Corp. brought out its first multi-functional executive workstation, Kontakt, combining electronic mail, time management, financial planning, data communications and word processing with voice communications. It is capable of operating with any existing analog telephone system and will provide specific interface capabilities for both analog and digital PBXs.

## 2.2 Integrated Information Management Systems

Near the close of 1982 Northern Telecom publicized a five-year research and development program to devise an integrated information management system called "OPEN World" (Open Protocol Enhanced Networks). The plan calls for a variety of systems, equipment, networks and services to operate under the control of an SL PBX controller to form one integrated, evolving system.

While products, services and features to implement the system will be available from the company, some of its interface specifications are being made available to other manufacturers and co-operative agreements are being negotiated with a number of major data processing manufacturers to ensure maximum compatibility of equipment.

## **H. Environmental Factors**

### **1. Regulatory Trends and Standards**

#### **1.1 Regulatory Trends**

1.1.1 In Canada the business sector and government are served by two national carrier groups who provide a wide variety of specialized voice and data services on a competitive basis. A distinctive feature of the industry structure in Canada is that regulatory jurisdiction over the carriers is exercised at the federal, provincial and in some cases the municipal level. Therefore when examining regulatory trends it is necessary to take into account the sometimes differing regulatory climates.

1.1.2 At the federal level the CRTC has, in a number of cases, moved in the direction of greater competition where it has determined that such a move was in the public interest. In a series of decisions which affirmed the right of subscribers to attach their own equipment to the telephone network, the commission has permitted a greater degree of competition in the terminal equipment industry. At the provincial level varying degrees of increased liberalization of terminal attachment rules are planned in P.E.I., Nova Scotia, Quebec, Manitoba and Alberta.

1.1.2.1 CRTC Decision 82-14 provided for the continuation of the liberalized policy of permitting the attachment of subscriber-provided terminal equipment within the telephone companies regulated by this body: Bell Canada, British Columbia Telephone, Terra Nova Tel and NorthwesTel.

In addition the decision provided direction on such important issues as:

#### **Inside Wiring**

- Multi-line subscribers leasing their terminal equipment from the carrier will continue to have the inside wiring provided by the carrier. Those who choose to purchase will be required to provide their own associated inside wiring. The decision also covered such points as demarcation point and selling in-place multi-line wiring that can be reused.

#### **Interpositioning**

- Interpositioning equipment will be permitted following development of the necessary standards.



### Telex and TWX Terminals

- Telex and TWX subscribers may attach their own terminal equipment to a carrier's network provided the appropriate technical standards are met.

### Network Non-Addressing Devices

- Any network non-addressing devices certified by DOC, and bearing a label to that effect, may be attached to a carrier's network.

Also included in the decision were guidelines on issues such as technical standards and participation by carriers in the terminal equipment market.

Telecommunications Coordinators throughout the Government may obtain additional information of the revised policies of four companies involved and their resulting implications as well as the current policies of the other major Canadian telephone companies in GTA Circular Letter 83/375.

It should be noted that the TAC Working Group on Telecommunications Planning has formed a subcommittee to deal with the issue of building wiring. Recommendations from this group will result in the development of firm guidelines dealing with this issue.

1.1.3 Another CRTC decision permitted CNCP to interconnect with the B.C. Telephone local telephone network as well as that of Bell Canada. This will allow greater competition in specialized and private line services.

### 1.2 Standards

1.2.1 In both CCITT (International Telegraph and Telephone Consultative Committee) and the International Organization for Standardization (ISO), there continues to be a high level of activity to develop a Reference Model for Open Systems Interconnection (OSI) which will permit the linking of computer communications systems and services of different manufacture and protocols. The establishment and implementation in Canada of such standards are fundamental to the full realization, through interconnection via Canadian public telecommunications networks, of new national information services such as the National Library Bibliographic Network, Telidon/Videotex Systems, Office Communications Systems, Electronic Payments, Messaging and Trade Information Systems.



1.2.2 In another area, the Telecommunications Advisory Committee (TAC) monitored the development of a bilingual glossary of telecommunications terms.

1.2.3 The UHF Spectrum Allocation Policy announced in March 1979 made available spectrum in the 400 MHz and 800 MHz bands to be used by medium and high capacity public mobile radiotelephone systems and other mobile radio systems. These systems, referred to as cellular systems, will provide the opportunity for a superior quality of service compared to existing radiotelephone systems and will in future allow for the operation of portable radiotelephone units at reasonable cost for government and business users in Canada and the U.S.A.

As widespread application increases, national compatibility will be a requirement of cellular systems. In order to achieve national and, hopefully, Canada/U.S. compatibility, a number of technical, administrative and other factors are involved. On the question of technical standards, the U.S. Federal Communications Commission adopted, with certain modifications, the standards recommended by the Electronic Industries Association (EIA). The Department of Communications and an ad hoc group of the CRTPB (Canadian Radio Technical Planning Board) Land, Fixed and Mobile Committee are currently reviewing the EIA standard. Based on the results of this review, these standards may be adopted by DOC with modifications as necessary for use in Canada.

## **2. Economic Influences**

The recession that plagued the Canadian economy throughout 1981-82 had its impact on the electronics industry as well as other areas.

Perhaps the largest industrial employer of technical and scientific workers in Canada, the industry suffered a trade deficit of \$3.3 billion in 1981, about half of which was accounted for by the computer and office products sector. By 1985 this deficit is expected to reach \$5 billion with an accompanying loss of 60,000 jobs in the interim.

Statistics for telecommunications, however, are somewhat brighter. In 1981 telephone apparatus and parts experienced a trade surplus of \$208 million in addition to \$191 million in commercial communications equipment.

In the longer term, by 1990 the Canadian market for integrated office automation systems is foreseen to be between \$15 and \$20 billion and the international market 20-25 times greater. Obviously this sector represents the potential for significant gains in revenue and jobs to Canadian industry and labour.

The Canadian telecommunications industry is continuing to experience rapid technological change driven by advances in the fields of electronic switching, digital transmission, satellite technology, fibre optics and cellular communications. These advances have a very significant effect on the characteristics and capacity of telecommunications systems and continue to lead to decreasing real costs of telecommunications services. Moreover, the improvements in telecommunications technology are only part of the broader range of advances in many areas of electronics. Of particular significance are the advances in computing, both in information storage and in data processing, that have led to dramatic improvements in the performance, reliability, software and productivity of computer operations over the past 20 years. For example, in the mid 1960's, an IBM 360 model 30 computer could perform 33,000 additions per second and cost in the neighbourhood of \$280,000. Today, IBM manufactures a personal computer that can perform 700,000 additions per second and costs approximately \$5,000.

One of the results of these technological developments is the increasing convergence of telecommunications and computing into a hybrid sometimes known as telematics. There is no doubt that the on-going advances in telematics and in other areas of micro-electronics, together with the increasing level of diffusion of these innovations in the economy will affect the way we learn and work - education and employment.

Advances in telematics and related microelectronic technology may be expected to have the most significant impact on certain economic sectors:

- (1) where production is coming to be dominated by information processing, as in
  - printing and publishing
  - communications and education
  - office computing, accounting and word processing
  - banking and insurance, and
  - wholesale and retail distribution
- (2) where production processes still make use of functions suitable for further automation, i.e.
  - parts of the chemical industry
  - manufacture of plastic products, pottery, china, earthenware, glass and glass products
  - manufacture of wood and wood products, paper and textiles

(3) where products are still assembled from many single parts or where continuous oversight of production processes is needed as in

- the manufacture of motor vehicles, mechanical and electrical engineering, and
- the manufacture of precision instruments

1981/82 heralded an awakening to the realization that low productivity is hampering our ability to be competitive in world markets. The punch came when it was disclosed that Canada has the lowest productivity rate of any of the eight largest members of the Organization for Economic Cooperation and Development.

In the federal Government white collar productivity is the area of primary focus and efforts are being made by various field trial evaluators to measure productivity shifts as new systems are introduced.

Stanford Research Institute figures indicate that office productivity in the United States rose only four per cent in the decade 1967-77. The payoff to office automation is expected to be achieved through gains in productivity in the managerial and professional realms where 66 per cent of the labour costs are concentrated.

Teleconferencing, electronic mail and home workstations are all potentially productivity-efficient and at the same time can replace the conventional alternatives that are so highly energy-consumptive. Through these and other technological innovations the Government can combat inflation within its own bureaucratic boundaries.

While broad economic advantages are obvious, less certain is the impact of the speed of change and the net impact on employment.

Apprehension about the effects of technical change on labour dates back at least as far as the first century when the Roman Emperor Vespasian opposed the use of water power for fear it would create unemployment. During the industrial revolution textile workers with the same concern destroyed new labour-saving machinery powered by steam engines. History is filled with examples of changes in instruments, processes and products which have caused dislocations in employment and skills.

In the short term the information industries have created jobs. Looking ahead into the mid-'80s, however, the contribution of these industries to strong economic growth could be diminished by a shortage of skilled labour.

Special training programs in high technology skills and their enlargement, together with re-training programs for those who may be displaced, are urgently needed in the federal Government to prepare human resources for the automated office.

### **3. Social Factors**

A consumer study by an American consulting firm, Yankelovich, Skelley and White, provides an interesting profile of people in the '80s. With less money for entertainment and travel, we are spending more time around home. The study indicates a growing passivity - attributed to an aging population - and a gradual acceptance of alternative lifestyles. Hostility toward government and business, erosion of the traditional middleman's role and an increasing reliance on communications are emerging, as is the all-important breakthrough for the communications industries: a conversion from the fear of the '60s and '70s to faith in technology.

Preceded by the sudden popularity of home computers, this change of attitude has begun to permeate the working environment. Home lifestyles are adjusting to the transition and so must the traditional office concepts undergo adaptation.

The automated office presents numerous challenges of the social and human factor variety: its effects on special groups of employees, such as women and managers; special classifications, such as clerks, stenos, typists; training implications in terms of needs, budgets, levels; career paths; health ... and so on.

In the federal Government we must concern ourselves with all of these factors and more. At the corporate level, Office Communications Systems (OCS) field trial evaluation teams and various interdepartmental committees have been assigned to address them. Their findings and recommendations will lay the groundwork for future Government policy.

Meanwhile, with the micro moved to the desk, managers find themselves confronted with a number of immediate concerns. Operational areas involving text processing and editing, electronic mail, data processing, electronic filing and management information are all affected and these represent a considerable percentage of office duties. As a workstation can provide the capability of performing more than one task, less physical exercise is required in an already sedentary environment. This, in turn, gives rise to potential health and social interface problems.



Prolonged, uninterrupted work at a video display terminal (VDT) has been found to produce symptoms of stress and fatigue. In equipping offices with terminals, managers should give careful thought to minimizing these hazards through ergonomics - the science of adapting equipment and environments to human skills and requirements. Bear in mind the characteristics of the office that workers have identified as most important to their job performance; namely,

- the ability to concentrate without noise and other distractions
- heat, air conditioning, light and ventilation
- access to tools, equipment and other work materials, and
- conversational privacy

Another area of particular current interest to the Government is distance and computer-assisted education. During the 1970s the federal Government funded the development and launching of experimental satellites and made channels available to provincial communications authorities and other organizations to conduct pilot trials, both in remote communities and in major metropolitan areas, to demonstrate the feasibility of using satellites in distance education. One such experiment linked classes of engineering students at Stanford University in California with their counterparts at the Carleton University School of Engineering in Ottawa, allowing students in both classes to see, hear and question between locations thousands of miles apart.

Furthermore, since all indications are that the cost of computing power will continue to fall, businesses, educators and Government agencies in Canada have been working for a number of years to develop the means to apply the powerful combination of advanced communications technology and low-cost computing power in an education setting.

One promising result of efforts in this area has been the development of Telidon, the highly sophisticated alpha-geometric videotex system developed by researchers at the Communications Research Centre (DOC). Telidon is essentially a computer-coding format that allows coloured graphics and text to be transmitted via telephone line, coaxial cable, broadcast signals, microwave, satellite, optical fibre or even laser beam. The Telidon system can be used to provide educational programs, diagrams and tests via small microcomputers in homes and classrooms. It can also be used as part of a videotex network with terminals attached to television sets accessing information from a number of host computers around the country or around the world. Additionally, the system can be used with large screen projectors for classroom or public displays.



The Department of Communications is assisting educational organizations in many parts of Canada to develop Telidon systems and software to be used as a teaching aid, an administrative tool, a self-learning system and even as a guidance counselling service to help students plan their career paths. Work is underway to integrate Telidon with educational computer languages, such as Plato and Logo, which allow even young school children to learn advanced concepts of mathematics and geometry through self-feeding terminals.

#### 4. Available and Emerging Technologies

"Innovation," as defined by Gordon B. Thompson, of Bell Northern Research, "is the application of technology". In addressing an economics seminar at the Department of Communications in June 1982 he gave the following explanation:

"The application of technology produces impacts on the host society, and it is impacts that characterize the innovation. Just as the physicist has never really seen an electron, and knows it only by its impacts, so we can only know an innovation by its impacts. Innovation, when viewed in terms of the impacts produced on the host society, can be divided into two classes, the intensive class, and the extensive class.

"The intensive class of innovation contains all those very important applications of technology where the major impact is one of intensification of already established processes. The class is characterized by notions of cost saving, efficiency, labour release, and substitution of new methods to do old things. In a word, the western idea of productivity gain describes the major aspect of this class of innovation.

"The extensive class of innovation contains all those innovations where the impacts can be described as extending widely across society and deeply throughout time. Here, the essential notions are of labour absorption, creation of new sources of wealth, and the doing of new things. Innovations of this class tend to be non-conservative in the sense that they allow an opening of the otherwise closed economic system, temporarily destroying the conservatism of the 'zero sum game' economy. In a deep and creative sense, this class of innovation produces fundamental increases in mankind's productivity by opening up whole new opportunity areas."

George Ray of the National Institute of Economic and Social Research uses the term "super innovations" and predicts in a Lloyds Bank Review article entitled "Innovation in the Long Cycle" that the next super-innovation is due either around 1985 or 1991.

On the assumption that the last "super" was the chip (1959) and given that the waves of its aftermath are still splashing into the economy, it is difficult to foresee another early advancement of such magnitude in this electronic technology. Those waves, however, represent significant innovations of the intensive variety, some of which are described in this section.

#### 4.1 Networks

Network technology has been particularly volatile. Dramatic new capabilities are emerging through advances in satellites, fibre optics, coaxial cable, microwave and cellular radio modes.

"The melding of television, voice and data networks now taking place will provide many creative opportunities for both vendors and user management," wrote Walter A. Levy in the November-December '81 issue of Business Communications Week. "This situation places a burden on user management to broaden its understanding of the technology and state of the market and be both prudent and innovative - a difficult challenge."

The following review of network activities on the global, national and federal Government levels is intended to give a helpful perspective to those confronted with that challenge.

4.1.1 On the global scene a digital communications system known as the Integrated Services Digital Network (ISDN), linked by satellite and optical fibre cables, is slowly taking form. It could create a worldwide telephone system, data and TV network. The main motivations for the ISDN are the economies and flexibilities its integrated nature promises. Many of the emerging new services are digital. These can be combined with existing services to use an integrated transport capability at a significantly lower overall cost than if each service used a separate transport capability. As well, networks will be able to be planned and constructed before the specific services of the future are defined, tested and made available.

The global concept presently being studied by the International Telegraph & Telephone Consultative Committee (CCITT), is based upon the use of space platforms positioned over the Pacific, Atlantic and Indian Oceans and connected by inter-satellite links.

As for the terrestrial bridges, which will use optical fibre cable, Japan is expected to offer ISDN service commercially in 1983. European countries have now started to introduce fibre optics into their communications networks and 1988 has been suggested as a reasonable target date for optical fibre cable use on North American routes.

The advantages of fibre optic technology, as compared with copper wire include a far greater information-carrying capacity, smaller diameter and lighter cables, lower loss (larger repeater distances), immunity to electro-magnetic interference and economy. A telephone system using glass is reported to expend about one-third the electricity required by today's networks and a further economic plus anticipated by the International Record Carriers is that old copper cables may represent scrap value exceeding the cost of the replacement fibre optic cables.

Research funded by the federal Government on fibre optics is described in para. 5.2.

4.1.2 In Canada, Northern Telecom plans to produce an integrated information management system within five years based on digital communications controllers. The concept is known as the OPEN World (Open Protocol Enhanced Networks). Existing copper wiring already installed in most buildings will be given increased transmission capability to become a high-capacity "information pipeline" extending to every desk. (Reference may be made to Section G 2.2.)

4.1.3 Through recent years in Canada many improvements have been brought about in the public switched telephone networks (PSTNs) as a result of the new technologies. The Government telecommunications network has, in turn, profited in terms of quality, efficiency and cost as the technologies have been made available; e.g.

- The latest packet technology is used to provide two highly efficient data communications networks: TCTS Datapac and CNCP Infoswitch.
- The Anik A domestic satellites have provided some government inter-city and facsimile traffic between Toronto and Vancouver, as well as teleconferencing across the country with a large number of R/T stations.
- The introduction of electronic stored program control (SPC) switches in the PSTNs during the past five to seven years has provided opportunities for a wider range of services, traffic measurements and network management/operation control; e.g., integrated centrex/telephone service and a traffic management system. In addition, numerous value added features are available such as multiple address delivery of single messages, address stored list, delivery priorities, central archiving, segment billing, alternative routing....

- The availability of electronic (SPC) technology in both small and large PABXs (such as the SG-1 and SL-1) has provided service improvement, service features and cost reduction for government services as have the families of electronic "digital" PABX systems introduced into PSTNs and government networks (the Northern Telecom SL-1 family and Mitel's SX series).
- Digital telephone switching technology, through PBX or Centrex service, can now support indifferently voice and data networks up to 64 KBPS and will soon have the capability of interfacing with universally accepted standard network protocols, such as X.25.
- The fast pace of network digitization (spanning customer terminal, transmission and switching facilities) is having a big impact on the architecture of private telecommunications networks and services leased from the carriers. This includes the Government inter-city and data networks using DMS, RLM, and digital transmission facsimile. To support leased lines, the new switching systems can interface with Telex, TWX, DDD, international telex and international DDD networks.
- Intelligent communications nodes allow interfacing of equipment from different vendors and concentrate the information on a single transmission path. Intercommunications of different vendor systems, to a certain extent, are also allowed. Future capabilities of these systems will improve to achieve total consolidation of data networks.
- As terminals multiply and increase in application, operating costs can be reduced through shared access and use within a common building site. The Local Area Networking concept emerged as a solution to permit the delivery and exchange of word processing, electronic mail, electronic files, teleconferencing, facsimile and voice mail.
- Progress has been made in establishing universal standards and protocols, such as X.25, X.21 or RS 449. Other standard protocols, such as OSI, are being developed and agreed upon which will permit intercommunication between different types of word processors, terminals, facsimile, and host computers.

Beneficial changes to the Government's private networks will be realized through the new technologies being field-tested in the Government. These tests involve videotex, communicating word processors, electronic mail, electronic files and video teleconferencing.



Provisioning of digital service in the early to mid 80s via the PSTN, Anik C digital channels, CNCP TDMA on Anik C and TCTS coast-to-coast digital radio (8 GHz) will greatly enhance Government telecommunications.

Anik C technology will provide an extensive number of telephony gateways and the availability of low cost echo-suppressors will offer significant potential for long-haul Government telpak to be carried in part by satellite.

In the area of mobile service, cellular radio and satellite technologies are opening up new vistas.

4.1.4 Local Area Networks (LANs) are proliferating to accommodate office automation. These are the internal office communications networks required to allow access to and communications with a variety of data and word processing equipment and systems. The system permits multifunctional workstations by allowing the individual to access computing power and data files, perform word processing and transfer documents to and from storage and other users. It may also provide telephone, voice messaging and limited terminal capabilities.

Three basic technologies are emerging for office communications: broadband, baseband and twisted wire pair. Choices depend on user requirements. Both baseband and broadband, using coaxial cable as a transmission medium, support high speed data. Xerox's Ethernet and WangNet, respectively, are examples of these. Because multiplexing can be used with broadband to divide the total bandwidth of the cable into many separate channels, image and voice can be serviced as well.

Twisted wire pairs are used primarily for voice communications. The extended capabilities of PBXs, however, permit them to act as control centres for both voice and data communications (e.g. SL- and SX- families of switches; Displayphone). High speed data transmission can be provided on dedicated lines.

Including PBX manufacturers, there are over 20 vendors marketing LANs of various kinds. In the PBX market, Rolm, Mitel, Northern Telecom and Intecom are offering digital PBXs with integrated voice/data networking.

By linking together local area networks using wideband satellite channels "super networks" will evolve.

#### 4.2 Satellites

The rise in demand for information services exemplifies the need for wideband facilities that can cope with the explosive traffic growth. According to a report from International Resource Development (IRD) Inc. by 1985 the market for wideband systems and



services will increase more than 100% over the 1981 total and will further redouble by 1991. Geostationary communications satellites provide wideband channels and have point-to-multi-point or broadcast capability, thus facilitating teleconferencing, video conferencing, electronic mail and other business applications. Since voice traffic can be digitized, it can be transmitted with the data, facsimile and video traffic as one integrated, digital bit stream. Subscribers can therefore adjust the mix of traffic which allows them to favor voice during the day, for instance, and data and facsimile at night. This flexibility leads to changes in management strategies favoring strong central control of the information services function.

Among the roles satellites have to play in the future is a switching of signals for flexible interconnection. This function, which employs time-division techniques combined with multiple access to switched or scanning beams, will not be applied until the late '80s.

Government plans for use of satellite technology are covered in Section F 2.1.2. For information on other field trials, see also F 2.2.1.1.

4.2.1 "The biggest, heaviest and most powerful communications satellite Canada has launched" found its place in space (104°W longitude at an altitude of 36,000 km above the equator) on August 26, 1982. It was the first of two Anik D satellites scheduled for launching during the year. With the Anik C-2, which will go into orbit in the spring of 1983, the Telesat space segment of the 1980s is nearing completion in both active satellite frequency bands: 6/4 GHz (Anik D) and 14/12 GHz (Anik C).

Aniks C and D will use new earth station concepts embracing advanced digital processing and control techniques. These powerful satellites will require receiving dishes only a metre wide - half the size and significantly lower in cost than those required by earlier satellites. Using time-division multiple access (TDMA) techniques, the new terminals will demonstrate the following features:

- rooftop-to-rooftop communications
- integrated voice, data, graphics and video teleconferencing services on one digital stream
- network reconfiguration within seconds, minutes or hours as required

- . user input ports from 2.4 Kb/s to 1.544 Mb/s
- . Programmable control for selected operational modes
- . high reliability resulting from fewer component parts or links in the office-to-office connection

4.2.2 A six-month trial of CCG's integrated satellite business network (ISBN) is designed to provide remote data entry, voice communications and on-line banking using 6/4 GHz capacity on Anik B to link Bank of Nova Scotia offices. The network will operate on Anik C's 14/12 GHz transponders. Allowing direct-to-user communications, it will provide a wide range of communications services for large and medium-size companies. ISBN will not only provide communications within Canada, but between Canada and the United States as well as overseas via Teleglobe Canada gateways.

4.3 Pushed by worldwide economic recession teleconferencing is predicted to become increasingly useful on an international scale this decade. Demand will force prices down while psychological barriers will dissipate under increased familiarity. Privacy when necessary will be achieved through coding, and telewriting will mean instant reproduction of sketches, graphs and diagrams on a video screen. The addition of on-the-spot-access to international data bases will add another dimension to teleconferencing.

Today audio teleconferences suffer acoustical problems related to feedback and reliability, voice quality and protocol (such as determining speaker priority without visual cues). At the same time videoconferencing is plagued by the complexity of connecting more than two videoconference rooms simultaneously, limited availability and limited interconnection among cities. As well, it is relatively costly. Ready availability of wideband channels will sharply increase its use. Full motion videoconferencing has been shown to be of little advantage and will not be in demand to any extent in the foreseeable future.

Videoconferencing is on trial on both the domestic and international scenes through the ISBN. By means of the international satellite link to Europe provided by Teleglobe Canada, European and Canadian centers are using standard television broadcast facilities and existing conference studios to permit videoconferencing in the international business community. The second phase of the plan will implement an experimental hybrid (video/audio/ graphic) teleconferencing service under an applied research and development project.

4.4 Speech recognition and voice response, two distinct, though related, technologies, have been developed separately, with few companies commercially engaged in both.

Voice response is a sophisticated electronic reconstruction of pre-recorded voice patterns. Actively marketed now in North America, it is the more advanced of the two.

Speech recognition systems, which require that a computer record, interpret and take action on what is said, are more rarely available. This technology has progressed to the point where data can be entered into a computer via the telephone line (even without a touchtone set). However, although up to 200 isolated words can be recognized by some systems, the state of the art is still in the infant stage.

Separately and in combination these two technologies represent dynamic possibilities in the data entry and retrieval fields and are expected to generate a booming business in future years.

4.5 Voice store and forward messaging is a vital component of office automation and, according to The Yankee Group (a Cambridge, Mass. consulting firm), "will shape the business and communications markets of the 1980s." Not an idle prediction when we realize that voice messaging is credited with increasing productivity by up to 25 per cent, decreasing telephone tag, reducing the number of in-house memos by up to 60 per cent, preventing the loss of urgent messages and reducing the problems posed by time zone differential and travel. And the technology is still young. Electronic Communications Systems (ECS), one of the prominent enterprises in this field, installed its first voice message system at the 3M Company in St. Paul early in 1980.

Unlike the popular computer-based messaging services, store and forward voice messaging eliminates the need for keyboard terminals. At the same time, for long storage retention the cost of voice storage is comparatively greater.

By means of the telephone the system permits the user to dial the code or telephone number of the person or persons to be addressed and record a verbal message which is digitized, stored and delivered either by depositing the message in the recipient's electronic mailbox for playback when messages are requested or by dialing the telephone number to force delivery. Messages can be sent to off-system recipients as well as registered users.

Advantages are obvious: Around-the-clock availability means transmission can take place in off-peak hours when rates are lower; it extends the work day; increases personnel availability; and overcomes time zone differences. Voice mail service is

usually provided by attaching specially designed computer equipment to a touchtone dialing telephone system. No modification of the system or telephone instruments is required and several voice mail systems at various domestic and international locations can be tied together to form a network.

In the United States ECS Telecommunications, Inc. is a leading American supplier whose Voice Message Exchange (VMX) is installed on the customer's premises and accessed through the PBX or Centrex. Wang Laboratories, Inc. have recently designed the Digital Voice Exchange (DVX) for integration into future office automation systems. This system can be accessed from any place at any time to record and receive audio messages called voicegrams.

These user friendly systems, based on a technology in which the cost is dropping rapidly, have prompted predictions that the American market for voice mail services may reach as high as one billion dollars as early as 1985.

4.6 Although voice-messaging offers many advantages, text-based systems will remain essential for long or complex messages. Together they represent a major movement away from the traditional mail service. According to the American-based International Resource Development Inc., paperless mail will be a \$5-billion service by 1992.

New offerings to handle electronic mail in the automated office appear daily. This area is changing so rapidly that some consider Teletex will not have a major impact on the market as progress will quickly overtake the communicating word processor and focus directly on the use of high power computer-based workstations.

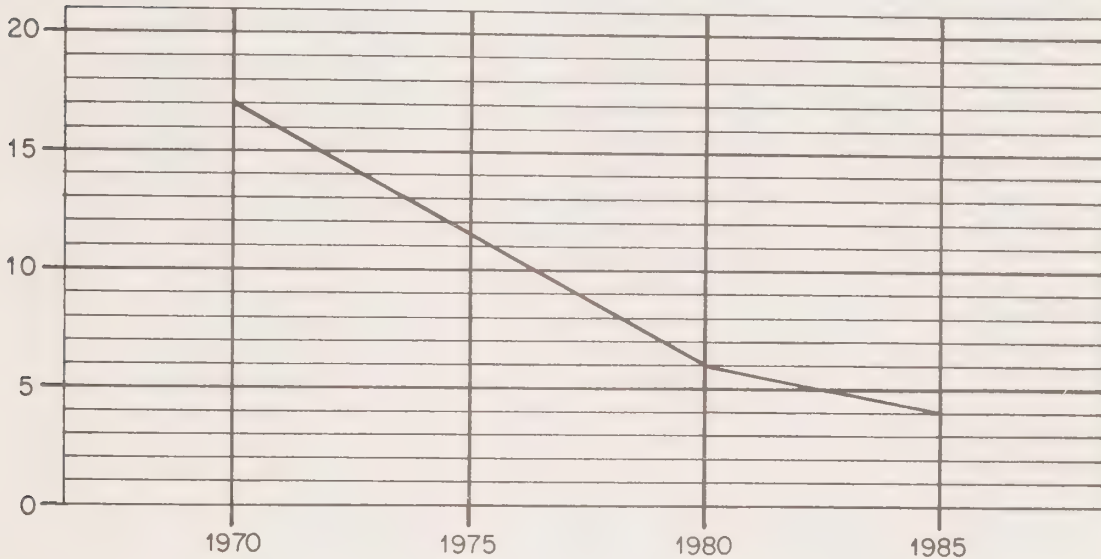
4.7 Advancement in technology continues to bring about unprecedented changes in telecommunications products, equipment life and cost. In all areas new procedures are consistently cheaper, more powerful, more reliable and more compact than their predecessors. The microprocessor, a typical example, has advanced four generations in 11 years:

- 1971 - 4 bit
- 1972 - 8 bit
- 1978 - 16 bit
- 1981 - 32 bit
- 1982 - 64 bit



This innovation has obviously had an impact on equipment life. Telephone PABX life expectancy, for instance, has taken a sharp plunge - a drop of 11 years between 1970 and 1980. (See Figure 2.)

FIGURE 2



#### 4.8 Some notable product advancements are:

4.8.1 Stand-alone digitizers for map-making and reading combine both plotter and display into complete systems; graphics systems allow scanned line art and photographs or computer-generated graphics to be merged with text; text-editing machines offer combined keystroke memory and graphics and act as off-line terminals for typesetting systems; teleprinters and word processors offer workstation flexibility by means of portable packaging and communications capability.

4.8.2 An intelligent copier-printer is now available from Royal that can "compose" documents from non-digitized material stored in a word processor. It allows pictures and charts to be inserted into the text for printing.

4.8.3 Digital facsimile devices have the potential to communicate with other office equipment, word processors and computers, as well as interface with both local and distributed communication networks. This means that far from approaching its demise - as some have devined in the recent past - facsimile continues as a



link in integrating information handling functions. Today's digital facsimile device, as opposed to its analog counterpart, can transmit a letter-size document in less than 30 seconds over a regular telephone line. The high speed devices (one minute or less per page) provide added features such as encryption, security identification code and delivery verification. While costs are higher for digital facsimile machines, some savings are achieved through reduced transmission time. In addition, improved copies with higher resolution are produced.

CCITT-approved standards permit Group III-compatible devices (the subminute-speed group) to transmit and receive to and from each other regardless of manufacture. At the time of writing, the international standards agencies are working on Group IV recommendations, which will address devices having still higher resolution and use ARQ techniques with data networks to ensure errorfree document reception. The Group IV devices are designed for facsimile transmission over public data networks.

The addition of character-scanning to the facsimile terminal will result in even faster transmission times and lower costs than have been achieved to date. By character-scanning alphanumeric characters, only a few bits of information per number or letter will have to be transmitted, thus reducing the total number of bits used to transmit the contents of a document. Logos, signatures and graphics will still be scanned by the facsimile unit.

4.8.4 Some departments have provided another scanning device, the Optical Character Reader (OCR), to improve efficiency in the preparation of typed copy. This equipment allows the first draft of a document to be typed on a conventional typewriter with certain fonts or type styles before being read electronically on to word processor disks. Once recorded on disks, further revision can be accommodated on the word processor, eliminating the necessity for repetition of keyboarding by word processor staff.

4.9 A new generation of large-scale integrated circuits to be used as the link between telephones and switching machines was developed by Northern Telecom Ltd. and announced in September, 1981. By permitting a number of key processes to be performed on a single chip, the cost of telecommunications switching equipment used by business is expected to be reduced.

4.10 Five Canadian manufacturers were producing Telidon equipment in 1982. Increased production and competition have resulted in improved quality and decreased price. The basic Telidon terminal (\$2400 in 1979) is expected to retail for about \$300 in 1984.

Telidon applications range from stock market information services in Toronto to agricultural service in Manitoba and California to banking in Buffalo to tourist information in Newfoundland to a baseball statistics data base developed in London, Ontario.

Novatex, the first international service using Telidon technology, has begun operations in several Canadian embassies and consulates. It will be used to serve businesses, government agencies and others in the international community.

## **5. Government Research and Development**

Japan, the United States and France all devote more than two per cent of their GNPs to research and development. To raise the relative level of Canada's investment in R&D to approach that of other countries Canada has undertaken to meet a target for Gross Expenditures on Research and Development (GERD) of 1.5% of GNP by 1985. One-third (0.5%) of that total is to be provided by the federal Government, one-half by industry and the balance, one-sixth, by provincial governments, universities and other services. The electronics industry spends more on R&D than any other industrial sector and performs nearly 25% of all industrial R&D in the country.

In 1981 Canada spent 1.07% of its GNP on R&D. This compares with 1.29% in 1967 - our peak year to date. According to the Canadian Advanced Technology Association the country should aim to achieve three per cent by the end of the decade.

The federal Government's share of GERD in 1981 accounted for 0.047% of the GNP. Its expenditures were 23.7% greater than in 1980/81 and are predicted to be 16.3% more in 1982/83 than in 1981/82. Each of these percentages represents more than \$40M in excess of the amounts required to achieve the 1985 goal.

The communications and space share of GERD in 1981/82 increased by 28.7% and 8.7% respectively over the previous year. Federal science expenditures in communications R&D in '82/'83 are estimated as follows:

Department of Communications	31.9M
Natural Sciences and Engineering	
Research Council	3.8M
National Research Council	2.6M
Supply & Services (unsolicited proposals)	1.2M
Others	0.2M
Total	<u>39.7M</u>

1982/83 space science and satellite technology R&D expenditures will amount to \$55.7M.

Some programs funded by the federal Government are described below.

#### 5.1 Office Communications Systems (OCS) Field Trials

5.1.1 The first phase of the OCS program, with an authorized budget of \$2.5 million, ended in the first quarter of 1982. It consisted of a feasibility study for implementing the field trials as a vehicle for industrial development and for planning the strategy for Phase Two. Accomplishments included the development of a field trial methodology; studies and reports on market forecasts, international trade trends and other matters; social and behavioral research to evaluate human impacts; a public information program, which included a film and a booklet, the publication of a nationwide survey of more than 50 Canadian office systems consulting organizations, and the initial preparation of a catalogue of Canadian office equipment manufacturers.

5.1.2 Phase Two of the program was approved by Cabinet in April 1982 with a budget of \$12 million. To be carried out over the following four years, it is focussed on major industry field trials in federal departments to provide industry and government with experience in designing, planning, generating and assessing integrated electronic office systems. Several objectives have been defined:

- a) to allow the government to measure the effectiveness of new technologies in improving the quality and efficiency of its services to the public;
- b) to address the social and economic issues;
- c) to research leading-edge technologies, productivity measurement and areas of related interest;
- d) to support field trials of new Canadian office equipment and systems within federal Government departments. New integrated office systems developed and tested in these trials will lead to proven products for sale domestically and internationally.

The social and economic issues to be addressed will include working conditions, employment patterns, productivity, worker health, and individual privacy. The implications of new office systems as they affect employment opportunities for women will be examined, as well as alternative methods of implementing the technology and methods of training and retraining office workers. Guidelines for the implementation and evaluation of the field trials will be developed by OCS.

5.1.3 The first trial, involving Bell Northern Research, Bell Canada and Northern Telecom, is comprised of three phases: Phase I, to last 12 months, will define functional requirements for office automation systems for managerial, professional and clerical workers. During the second phase the company will provide automated office support for between 50 and 100 users in two or three geographically separate sites. It will test text messaging, file handling, text processing, teleconferencing, decision support tools and public data base access. Bell system developments on trial are the Datapac switching telephone network, iNET intelligent gateway, Telidon Vista videotex system, Envoy 100 public message service, SL-1 switching system and Displayphone executive workstation. In the third phase several hundred workstations will be tried at about 10 sites and a set of more advanced functions, such as decisional support, will be implemented.

5.1.4 The second field trial was proposed by Office Communications Research Associates (OCRA), a consortium of Canadian companies and will consist of four phases lasting three years. Coaxial cable will be used as the local broadband access network transmission system and the CNCP microwave network (plus Telesat satellite facilities where necessary) will be the transport vehicle for inter-city transmissions.

In Phase I a field site will be selected, user requirements will be analysed and the field trial system designed. Phase II will involve training, implementation of a limited system with off-the-shelf equipment and selection of measuring techniques. Phase III proposes to use 100 to 200 workstations distributed across Canada for the further planning, training and development of hardware and software for office equipment and systems. In Phase IV up to 2,000 workstations will be installed for an 18 month trial concerning the purchase and installation of advanced systems and services, operation of the office automation systems, performance, evaluation, systems modification and assessment. A fully operational system would then result.

5.1.5 Systemhouse Ltd., a Canadian software and systems company, proposed the third field trial, for development of new software to integrate office workstations with local access networks, data processing facilities and private and public communications systems. The focus will be on office clerical, managerial and professional functions, activities and personnel.

5.1.6 A study has been conducted to assess the office automation needs of senior management and the Policy Sector of the Department of Communications. In particular, it focussed on budgeting, management of correspondence, messaging and communications activities in the department's headquarters and regional offices.



5.1.7 As well, Officesmiths, Ltd. an Ottawa-based software company, will develop an "electronic filing cabinet" and an automated business manuals management system. The "filing cabinet" is a software program which runs on various microcomputers to allow for access and retrieval of office documents and information stored in electronic form. In the trial this capability will be applied to the administrative needs of Energy, Mines and Resources.

If successful, procedure manuals for official languages, personnel and finance policy will be incorporated into the system. The long-term goal is to integrate a wide range of administrative support functions so that the system can be used for all administrative activities in the department.

## 5.2 Fibre Optics

Fibre optics technology is still relatively new in terms of development but much older in basic theory. The concept of transmitting telephone signals by light waves was recorded by Alexander Graham Bell nearly 100 years ago.

Major categories to which this technology is currently being applied are the telephones, computers, cable television and military installations. Ongoing research is taking place at the DOC/Communications Research Centre, which is studying the technical feasibility and optimization of using fibre optics in local area networks and developing key technology.

As well, the DSS Science Centre has awarded contracts in the field of fibre optics technology, which have resulted in (among others) the study of testing methodologies for fibre optic systems by Bell Northern Research, and efforts by the Canadian Instrumentation and Research Limited 1) to develop an experimental fibre optic hydrophone and 2) to study and demonstrate optical fibre magnetic field sensors.

Phase II of the fibre optics field trial programs for Elie, Manitoba has been essentially completed. One hundred fifty residents of Elie and nearby St. Eustache (two farming communities) that relied on party lines and rooftop antennae now receive single party, digital telephone service, nine TV channels, seven radio signals (including FM stereo) and Telidon. The trial concluded on schedule, but evaluations are still in progress. A final report is expected to be printed in the Fall of '84. Pending Treasury Board approval, assets of the trial will be transferred free of charge to MTS in return for maintaining the system. Trial sponsors will have right of use.



### 5.3 Satellites

5.3.1 The Anik B satellite, expected to terminate its useful life in the Spring of 1987, is supporting a number of Government field trials described in Section F 2.2.1.1.

5.3.2 Funding of \$17M was approved in the Spring of 1982 for Phase B of the Mobile Satellite (MSAT) program undertaken by DOC and DND. Phase A studies were conceptual. They showed that MSAT is feasible and a commercial satellite could be economically viable. The purpose of Phase B is to define the design requirements of a multi-use demonstration vehicle and the economics of an operational mobile communications satellite.

A study addressing the issues of interconnecting the proposed demonstration system and later the operational MSAT network with the government network was completed by the Government Telecommunications Agency. Needs, economies, cost/benefit and system concepts were investigated. Interconnection would permit federal Government departments to be involved in experiments, field trials and pre-operational use of MSAT.

MSAT studies have determined that in 1981 there were 380,100 mobiles requiring, other than metropolitan area only, service within the government and industry sectors of Canada. This number is projected to grow to 950,000 mobiles in the year 2001. Currently these vehicles are being served by conventional terrestrial mobile radio. Of the 380,100 mobiles in the above category, 68,500 are associated with the multi-level government sector and these are projected to grow to 115,000 by 2001. Of the five basic services covered by the general term "mobile radio service", only the Mobile Telephone Service (MTS) is of interest from the point of view of the federal Government telephone network since none of the others may be directly interconnected to it.

The MTS as presently conceived is a system which enables a mobile, equipped with a radio-telephone, to set up connections through the switched telephone network. In effect, it is an extension of the normal telephone facility to the mobile. The limited range of the terrestrial cellular mobile radio systems means that users have to remain within about eight miles of a base transmitter in order to receive acceptable service. With the introduction of a satellite communications system the range over which the mobile telephone service may be received is extended to encompass virtually all of Canada. Mobiles located many hundreds of miles from a field base station would therefore have full access to large metropolitan centres by direct telephone link. In principle, that telephone link could be extended to any location in the world, if required.

It may be assumed that the MTS capability will be an important offering of the MSAT network. As such, the capability will automatically exist for interconnection between telephone sets in the Government network and sets in the mobiles; this interconnection could take place through the Public Switched Telephone Network. Whether a separate access post for the Government network is justifiable will be measured by a number of factors. Some of these are:

- i) additional MTS features required for Government users which are not available in the public MTS, e.g. high speed data
- ii) economic attractiveness of tariff rates
- iii) reduction in DDD toll charges by using the Government inter-city network
- iv) regulatory constraints.

#### 5.4 Telidon

Under the Telidon Industry Investment Stimulation Program (IISP) the federal Government has arranged to have 6,000 Telidon terminals built by Canadian firms and made available for use in new Telidon systems operated by the private sector. Funds have been provided to 52 successful applicants who have agreed to match the Government's investment by buying at least an equal number of Telidon terminals and to pay for content development, communications charges, salaries and other operating and marketing costs. \$10.5M was to be spent on the program in 1981 and 1982.

#### 5.5 Decentralized Bibliographic Communications Network

An initiative towards the objective of achieving a nation-wide decentralized bibliographic communications network has been taken by the National Library through its participation in iNET trials. The pilot project will test the utility of new telecommunications technology for bibliographic data interchange.

The National Library will coordinate a group of six library participants which will develop and test computer interfaces to the network including network directories; the derivation of bibliographic data from diverse data bases; electronic messaging for interlibrary loan; the application of videotex and videodisc to library applications; and prototype automatic data transfer between disparate bibliographic systems. Important data for future technical network operations and development are expected to be provided from the evaluation of the pilot project.

#### 5.6 Semi-Conductor Technologies

The National Research Council has been assessing what supporting role its laboratories could provide in semiconductor device R & D. A likely possibility would be provision of a national facility

available to industry, universities and other government organizations which would be equipped with analytical instrumentation applicable to a wide range of semi-conductor technologies. Work would include materials research; manufacturing methods and procedures for devices and microcircuits; design, construction and testing of microcircuits for special applications; and research into the effective application of microcircuits. It could also house national standards labs. Such a facility could mean repatriating semiconductor production of the order of \$500M a year within five years. This would be in line with the 1982 recommendations of the Science Council in its assessment of the future of the Canadian high-tech industry.

### 5.7 University Research

The Department of Communications will provide \$1,224,804 in 1982/83 to 22 Canadian universities for research projects. Of the 52 contracts to be awarded, 35 (accounting for about two-thirds of the funds) are allocated under the University Research Program. The remaining 17 are funded under the Program for the Promotion of French-Language Centres of Excellence.

Related to the federal Government's responsibilities for the regulatory, social, economic and technological aspects of communications and culture, the two research programs are designed to develop centres specialized in these sectors within Canadian universities, as well as to assist in the training of specialists for industry, government and universities.

Generically speaking, studies are being conducted in the fields of mobile radio, fibre optics, videotex, communications satellites, radio-relay systems and the allocation of spectrum frequencies.

Three research projects commissioned on behalf of the Government Telecommunications Agency were completed in 1981/82. They were reported under the following titles:

#### 1. Development of Guidelines for the Evaluation of Proposed TELIDON Applications (Carleton University) -

This report addresses the evaluation of videotex services in the federal Government. A set of guidelines concerning the issues to be addressed in the evaluation of proposed Telidon applications is developed in the context of recent experience with Telidon.

The guidelines fall into the categories of Planning Process, Organizational and Social Aspects, Economic Aspects and Technical Aspects. The report also presents procedures for using the developed guidelines.

2. Communications Controller for Word Processors  
(Queen's University, Kingston) -

This study provides a design tool for defining the system requirements and technical feasibility of an intelligent communications controller for word processors. Such controllers would permit a number of word processors to share communication lines and other common resources such as high speed printers, as well as provide communication between the terminals themselves. In providing the latter service it would perform protocol translation to permit interworking between word processors.

The report includes a listing of a simulation package developed to provide an analysis of the quantitative parameters of performance measurement as a function of the controller configuration.

3. Development of Shared Local Communications Network Topology  
(University of Windsor) -

A mathematical analysis of the economics of local government telecommunications networks is provided; in particular the cost of provisioning a Government building with telephony service in a metropolitan environment. Computerized cost models are developed and used to investigate the Ottawa/Hull network alternatives.

## I. APPENDICES





## APPENDIX I

### CASE STUDIES

#### 1. Health and Welfare Canada's Policy Decision Re Call Codes

Controlling the use of telephone call access codes was one of the suggested methods for obtaining adequate control over the use and cost of telecommunications included in the 1979 Auditor General's Report. An example of the application of policy to control call codes and their resulting costs is Health and Welfare Canada's Financial Management Manual, Subject 3.4.17 "Telephone Call Codes".

Publication of this policy was preceded by a report entitled "Government Telecommunications Service - The Telephone System - Telephone Access Codes - An Analysis of Use and the Financial Implications of the System in National Health & Welfare", D. Woodward, July 16, 1980.

This analysis identified the problem as cost related - mainly human, in that 51.52% of Health & Welfare total telecommunications costs in fiscal year 1979/80 were incurred for long-distance voice communications. Breaking the "Telephone System" into three components (hardware, user-operated system, and operator-assisted system) the analysis pointed out that calls incur a cost, dependent on the traffic pattern and usage. Concentrating mainly on "Call Codes" the analysis went on to explain that the control weakness was not in the number of codes as much as in the number of holders sharing a common code. This resulted in a lack of accountability.

Conclusions of the analysis included the following suggestions:

- a. The government intercity telephone access authorization code/card problem is of human not system dimensions - users not aware of costs involved, believing it to be free or billed as a standard charge irrespective of usage.
- b. Cost control relates to accountability which in turn relates to administrative arrangements employing the authorization codes efficiently and issuing "live" calling guides judiciously.
- c. Cost control could be attained by issuing codes to each Responsibility Centre Manager who justifies the need and is personally accountable for costs incurred. It is incumbent on managers to issue cards only on an "as required" basis and to ensure that expenditures were for government business only.

- d. Cost analysis is desirable to advise the Branch Head of the level of expenditures incurred per code.
- e. Clear instruction should be provided to code users on the most cost-advantageous method of long distance calling.
- f. That a financial policy be designed for call codes.

Accordingly, in October 1981 Health & Welfare issued its directive showing as its purpose, "To state departmental policy concerning the authorization and control of telephone call codes". The directive virtually prohibits issuance of Class A and Class S codes except under exceptional circumstances, as well as discouraging issuance of Class B and Class C codes because of the ready availability of alternate calling methods and the possibility of abuse. Listing several other methods of placing long-distance telephone calls it recommends that the issuance of call codes be restricted to situations where employees regularly generate a high volume of long-distance telephone calls in the course of carrying out assigned duties and (a) regularly are in travel status where there is no access to the government intercity telephone network by means of a government telephone; or (b) there is no other practical method for recovering the cost of official telephone calls.

Decision guidelines for reviewing a request by an employee for a telephone call code are given as well as cost considerations being set out.

A policy of one call code to one person is recommended with the designated holder accountable for the call code's use and the costs incurred thereby. Further, branches are required to report annually to the Deputy Minister on the use of telephone call codes.

Through the publication of this firm directive Health and Welfare Canada have illustrated development of telecommunications management policy. Having formerly found telephone call codes difficult to control, discipline has now been achieved utilizing a financial policy to place the authority to issue and the responsibility for the cost at the level of Branch Head.

## 2. Transport Canada's Application of Treasury Board's Telecom Policy

The Telecommunications and Electronic (T&E) functions within Transport Canada have been reviewed frequently over the past few years with each review expressing concern over the role, management and coordination of the function in the Department. Compliance with Treasury Board's APM Chapters 435 and 436 has been achieved with the establishment of a departmental steering committee and an internal working committee which sets firm policy directives and guidelines. Terms of reference for these two committees - Transport Canada Telecommunications and Electronics Committee (TCTEC) and the Inter-departmental Telecommunications and Electronics Committee (ITEC) - as well as a delineation of their responsibilities and authority for their functions was published at the Deputy Minister level.

### The Transport Canada Telecommunications and Electronics Committee (TCTEC)

The executive level of this new two-tier committee structure is chaired by the Senior Assistant Deputy Minister and oversees, through semi-annual meetings, the activities of the ITEC. TCTEC provides a central body for the review and approval of major T&E issues, normally those of departmental scope and/or having significant policy and resource implications. Specifically the committee:

- ensures that Transport Canada's T&E policies and programmes fully reflect both governmental and departmental policies and requirements;
- approves the mandate of the ITEC as described and in the responsibility matrices;
- ensures that the responsibilities and tasks assigned to the ITEC are carried out as planned;
- provides directions and advice to ITEC on the coordination of activities;
- examines problems arising from ITEC deliberations and provides guidance on recommended action as appropriate; and
- reviews special reports or issues related to T&E referred by other government departments or agencies or arising from central agency directives or observations.

Intra-Departmental Telecommunications and Electronics Committee  
(ITEC)

This committee, chaired at the Director level, acts as the focal point for all T&E matters affecting the Department as a whole. Members of this Committee represent management of all telecommunications and electronics functions within the Department. Specifically the committee:

- is the focal point for all T&E matters affecting the Department as a whole;
- reviews and makes recommendations on Departmental T&E policies;
- identifies activities that fall within the responsibilities of the Committee;
- is the focal point for ensuring effective Departmental coordination and direction on all T&E matters as defined;
- reviews T&E policies and directives issued by Treasury Board and makes recommendations to TCTEC to ensure that these policies are being adhered to;
- performs the function of the Telecommunications and Electronics Coordinator as outlined in Treasury Board Administration Policy manual chapters 435 and 436 with the Chairman acting as the spokesperson for the committee;
- maintains an inventory of all T&E related committees and subcommittees.

Efforts of ITEC during 1982 centered on the assessment and planning of Departmental compliance with APM 435 and 436, more specifically:

- development of an interpretative definition of Telecommunications as the term relates to the two above noted chapters;
- restructuring of departmental financial coding for telecommunications expenditures;
- initiation of a departmental update of the telecommunications audit conducted by the Auditor General in 1979;



- an in-depth review of the two above noted chapters to determine applicable directives and guidelines and the current degree of compliance with their provisions by the department.

In conjunction with the review of APM 435 and 436, a revision of the expenditure reporting code structure is approaching completion. Although some improvements in the line object codes were implemented as of April 1982, this amendment will provide line object codes to be implemented effective April 1, 1983 for all classes of "Telecommunication" expenditures of \$25,000 or more.

Efficient and effective management of telecommunications facilities and services within Transport Canada have been and will be enhanced through the firm guidance and policies being supplied by the aforementioned committees.



## APPENDIX II

### READING/VIEWING GUIDE

Canadian Office, edited by Bruce Glassford, Whitsed Publishing Limited.

A monthly publication dealing with the various facets of office automation.

Coates, Sharon, The Office of the Future, Department of Communications. Available from Information Services Division, Department of Communications, Ottawa, Ontario, K1A 0C8 (613)-995-8185.

Designed to contribute to public awareness of issues of importance to the development of communications in Canada. Industry and Government are urged to cooperate to develop a Canadian automated office industry.

Communications and the Future: Prospects, Promises and Problems, edited by H.F. Didsbury, World Future Society (United States, 1982). ISBN: G-930242-16-5.

An excellent collection of articles from the world's leading communications experts.

Connaghan, Charles J., The Japanese Way: Contemporary Industrial Relations, Department of Labour, 1982. Available from Distribution Centre, Labour Canada, Ottawa, Ont., K1A 0J2; (819)-994-0543.

An industrial relations reference for use by those interested in new approaches to the changing industrial relations field.

DELTAK Inc. Videocassettes, Resource 7: Management Strategies for Office Automation. 61-0XX. Available through the Informatics Learning Centre, Public Service Commission (613)-997-6083 or directly from DELTAK Inc., Suite 2100, Tower A, Place de Ville, Ottawa, Ont. K1R 5A3.

Consists of five tapes varying in duration from 45 - 90 minutes. Government rate: \$60/tape/month.

Employment Impacts of New Technologies, Canada Employment and Immigration Advisory Council, December, 1982.

A study of the issue of new technologies and their impact on employment.

Federal Office Automation Conference papers, Washington, D.C., October, 1982. Available in the DOC library.

A collection of symposium papers and slide reproductions from the third U.S. Federal Office Automation Conference.

In the Chips: Opportunities, People, Partnerships, Labour Canada, 1982. Available from Publications Distribution Centre, Labour Canada, Ottawa, Ontario, K1A 0J2; (819)-994-0543.

A report of the Task Force on Microelectronics and Employment which examines the implications of microelectronic technology on Canada's workplace.

Martin, James, The Wired Society, Prentice Hall Inc. (United States, 1978). ISBN: 0-B-961441-9.

Convincingly argues that it is imperative to employ new technologies to tackle our problems and build a better world. Outlines the technological developments of communications which are changing the entire fabric of society in both developed and developing nations.

Planning Now for an Information Society: Tomorrow is too Late, Science Council of Canada, March, 1982. Available by mail from Canadian Government Publishing Centre, Supply and Services Canada, Hull, Quebec, K1A 0S9 and some bookstores. \$4.50.

Assesses the possible effects of microelectronic technology on industry, employment, education, scientific research and individuals.

Stanbury, W.T., Thompson, F., Regulatory Reform in Canada, The Institute for Research on Public Policy, Montreal, 1982.

Section 3. Telecommunications Regulations: Toward More Competition identifies some of the salient characteristics of the existing regulatory system and provides a lucid and informative discourse on recent regulatory and policy decisions, including terminal attachment and system interconnection.

The Electronic Office in Canada, Department of Communications, May, 1982. Available from Information Services, Department of Communications, Ottawa, Ontario, K1A 0C8 (613)-995-8185.

A comprehensive study of productivity, employment, worker attitudes and technology by the Office Communications Systems (OCS) Program.

The Managerial Implications of Microelectronics, edited by B.C. Twiss, Macmillan, London (1981).

Covers a wide range of topics of importance to managers who are or will be concerned with the introduction of microprocessors into their businesses. Several authors analyse the effects of microprocessors on end products, on production processes and in the office from a managerial point of view. Non-technical.

Treurniet, W.C., Review of Health and Safety Aspects of Video Display Terminals, CRC Technical Note No. 712-E, Department of Communications, Ottawa, February 1982.

Reviews the factors that contribute to worker complaints when video display terminals are introduced into the workplace and considers the issue of electromagnetic emissions from television displays.





### APPENDIX III

#### CALENDAR OF EVENTS

The following '83 Communications Calendar is reprinted from communications week, published by Evert Communications Ltd., Ottawa.

# '83 COMMUNICATIONS CALENDAR

## January

- 16 - 19 Pacific Telecommunications Council, PTC'83, Sheraton Waikiki Hotel, Honolulu, Ha.
- 19 - 20 B.C. Computer & Office Automation Show, Hyatt Regency, Vancouver, B.C. (416) 252-7791 or (604) 873-4581.
- 31 - Feb 3 Communication Networks Conference & Expo. The Rivergate, New Orleans, La. (617) 879-0700.

## February

- 10 - 12 National Mobile Communications Expo, O'Hare Expo Center, Chicago Il. (213) 826-6070.
- 21 - 23 1983 Office Automation Conference, Philadelphia, PA. Deborah Kalbfleisch, (703) 558-3617.

## March

- 8 - 10 National Office Exhibition and Conference. Automotive Building, CNE, Toronto. Sponsored by Industrial Trade Shows of Canada.
- 14 - 16 Second Annual Phoenix Conference on Computers and Communications, Contact GTE Automatic Electric Lab, Phoenix, Az.

## April

- 10 - 13 National Association of Broadcasters, Convention & Expo, Las Vegas Convention Center, Las Vegas, Nv. (314) 721-7717.
- 17 - 22 IEEE Infocom 83, San Diego, Ca. Contact (301) 589-3386.
- 25 - 27 Satcom'83, International Association of Satellite Users, Conference & Expo, Orlando, FA.
- 27 - 29 Satellite and Computer Communications, International Symposium, Versailles, France. Tel (3) 954-9020 EXT. 600.

## May

- 2 - 5 Canadian Radio Common Carriers Association annual convention and trade show, Edmonton Convention Inn South.
- 10 - 12 International Computer Show and Conference, Olympic Velodrome, Montreal, Canadian Information Processing Society.
- 11 - 13 British Columbia Broadcasters, Delta Hotel, Penticton, B.C.
- 16 - 20 CIPS Conference, Ottawa, theme: "Converging Technologies."
- 16 - 19 Canadian Cable Television Association, Convention & Expo, Calgary, Alta. (613) 232-2631.

- 16 - 19 1983 National Computer Conference, Anaheim, Ca.  
(703) 558-3625.
- 29 - June 1 Western Association Broadcasters, Jasper Park Lodge,  
Jasper, Ab.
- June
- 12 - 15 National CATV Convention (NCTA'83), Astro Hall,  
Houston, Tx.
- 15 - 17 Satellite Communications Conference (SCC-83), Holiday  
Inn (Kent Street), Ottawa. Dr. K. Fehr (613)  
231-2288.
- 19 - 22 ICC'83, International Conference on Communications  
(IEEE), Hotel Sheraton, Boston, Ma. (617) 862-5500.
- 27 - 29 Videotex '83, New York Hilton, NY, NY. (212)  
947-1734.
- August
- 22 - 24 Satellite Communications Users Conference, SCUC'83,  
St. Louis, Mo. Satellite Communications Magazine,  
Denver, Co., (303) 694-1522.
- September
- 13 - 16 Cdn Industrial Communications Assembly, Convention &  
Expo Toronto, Harbour Castle Hilton. Margaret  
Robertson, (416) 499-4222.
- 19 - 23 Sixth Int'l Conference on Digital Satellite  
Communications, Phoenix, Az. Contact: H. Briley,  
c/o COMSAT, Washington D.C.
- 26 - 28 1983 Int'l Electrical and Electronics Conference and  
Exposition Exhibition Place, Toronto Ont.  
Theme: "Canada's Global Link - Technology and  
Communications", (416) 445-6641.
- October
- 3 - 6 Eighth Data Communication Symposium, Datacomm, Cape  
Cod, Ma. (301) 589-3386.
- 4 - 5 Ontario Cable Television Association, Convention &  
Expo, Triumph Sheraton, Toronto, Ont. (416) 481-4446.
- 23 - 26 Cdn Assn of Broadcasters Annual Meeting & Convention  
Toronto, Sheraton Centre. (613) 233-4035.
- 26 - Nov 1 Telecom 83 Exhibition, Geneva, Switzerland, ITU,  
Place des Nations, CH-1211 Geneve 20.
- November
- 14 - 17 Cdn Computer Show, Int'l Centre, Toronto.



WORLD COMMUNICATIONS  
YEAR





## APPENDIX IV

### GLOSSARY OF ABBREVIATIONS

ACD	Automatic Call Distributor
ACIS	Advisory Committee on Information Systems
ACS	Automatic Call Sequencer
AECB	Atomic Energy Control Board
APM	Administrative Policy Manual
ARQ	Automatic Request - Repeat
ASCII	American Standards Code for Information Interchange
CBMS	Computer Based Messaging System
CBX	Computer Based Exchange
CCG	Computer Communications Group
CCITT	International Telegraph and Telephone Consultative Committee
CCS	Correctional Services Canada
CIDA	Canadian International Development Agency
CNCP	Canadian National - Canadian Pacific Telecommunications
CRTC	Canadian Radio - Television and Telecommunications Commission
CVCC	Canadian Videotex Consultative Committee
CWP	Communicating Word Processor
DAMA	Demand Assignment Multiple Access
DDD	Direct Distance Dialling
DND	Department of National Defence
DOC	Department of Communications
DOE/AES	Department of Environment/Atmospheric Environment Service
DSS	Department of Supply and Services
DVX	Digital Voice Exchange
EA	External Affairs
ECS	Electronic Communications Systems
EIC	Employment & Immigration Canada
EPD	Electronic Data Processing
EEWD	Enhanced Exchange Wide Dial
EIA	Electronic Industries Association
EMR	Energy, Mines & Resources
EMS	Electronic Messaging System
GDNS	Government Data Network Service
GEMS	Government Electronic Messaging System
GERD	Gross Expenditures on Research and Development
GHz	Gigahertz
GNP	Gross National Product
GTA	Government Telecommunications Agency
HWC	Health & Welfare Canada
IAND	Department of Indian & Northern Affairs
IISP	Industry Investment Stimulation Program
iNET	Intelligent Network
INWATS	In-Wide Area Telephone Service
IOTA	Inventory of Telecommunications Applications
IRC	International Record Carrier
IRD	International Resource Development Inc.

ISBN	Integrated Satellite Business Network
ISDN	Integrated Services Digital Network
ISO	International Organization for Standardization
ITEC	Inter-departmental Telecommunications & Electronics Committee
ITSP	Information Technology and Systems Plan
ITT	International Telephone and Telegraph Corporation
IX	Inter-city
LAN	Local Area Network
LC	Labour Canada
MHS	Message Handling System
MSAT	Mobile Satellite
MSST	Ministry of State for Science and Technology
MTS	Manitoba Telephone System
NCR	National Capital Region
NMS	Network Management System
NPB	National Parole Board
OCR	Optical Character Reader
OCRA	Office Communications Research Associates
OCS	Office Communications Systems
OPEN	Open Protocol Enhanced Networks
OSI	Open Systems Interconnection
OUTWATS	Out-Wide Area Telephone Service
PBX	Private Branch Exchange
PABX	Private Automatic Branch Exchange
PSC	Public Service Commission
PSTN	Public Switched Telephone Network
RCMP	Royal Canadian Mounted Police
R&D	Research and Development
RC-C&E	Revenue Canada - Customs & Excise
RC-T	Revenue Canada - Taxation
SCPC	Single Channel per Carrier
SPC	Stored Program Control
TAC	Telecommunications Advisory Committee
TASC	Telephone Answering Site Consolidation
TB	Treasury Board
TC	Transport Canada
TCTEC	Transport Canada Telecommunications and Electronics Committee
TCTS	TransCanada Telephone System
TDMA	Time Division Multiple Access
T&E	Telecommunications and Electronic
TECA	Telecommunications Cost Analysis
TSO	Telecommunications Service Officer
UHF	Ultra High Frequency
VDT	Video Display Terminal
VMX	Voice Message Exchange
WATS	Wide Area Telephone Service









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